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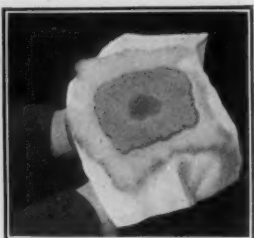
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THE LARYNGOSCOPE.

VOL. XXVI.

ST. LOUIS, MAY, 1916.

No. 5.

ORIGINAL COMMUNICATIONS.

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CONCERNING THE ARTICULO-RESPIRATORY DISTURBANCES OF SPEECH. A PRELIMINARY REPORT.

DR. OTTO GLOGAU, New York City.

Within recent years the special fields of medicine show a greater tendency to broaden and deepen their scope. Modern otology, for instance, now includes in its realm the study of equilibration, and the diagnosis and treatment of such pathological conditions of the cerebrum and cerebellum as are even in a remote way connected with the function of the acoustic and vestibular nerves. Modern rhinology does not at the present time restrict itself to diagnose and treat the visible and tangible interferences with breathing and speech. It delves into the subject of normal and pathological physiology of the organs of breathing and speech and into the study of their central localizations. By including experimental phonetics into its field of research, modern rhinology now comprises the entire circle of breathing and speech, instead of as before, when it only embodied its external part located within the upper respiratory tract.

Breathing in general serves exclusively for the regeneration of the blood by fresh oxygen. Entirely different from it is that type of breathing which provides the propelling power of speech. We will try to prove that the utterance of articulate sounds (articulation) depends upon the mastering of the economy of breath during speech. By terming the breathing during articulated speech as

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"articulatory respiration," we differentiate it from breathing that serves exclusively to the conservation of the organism. The latter type of breathing we will call "animal respiration." It is our intention to establish the fact that abnormalities of articulatory respiration cause quite a number of disturbances of speech that heretofore have been attributed to other factors. We will be led to the assumption of an articulo-respiratory center within the brain and to a consequent readjustment of the circle of speech. The time-honored theory of a respiratory center within the medulla oblongata will be abandoned. The attempt will be made to localize the function of animal breathing within the ganglion cells of the motor nerve roots of the respiratory muscles.

Breathing is a low function met with in both plants and animals. Through it certain chemical elements of the air are assimilated just as those of food during the process of digestion. Before trying to analyze animal and articulatory respiration in the speaking human individual, we will roughly sketch the phylogenetic development of the faculty of breathing, and then the ontogenetic evolution of the functions of breathing and speech. Special organs of breathing do not exist in the plant. Every cell is occupied in the assimilation of oxygen from the atmosphere and in the giving off of carbon-dioxide and water. In those plants which contain chlorophyll, the carbon-dioxide is absorbed and decomposed under the influence of the sunlight. Thereby oxygen is evolved and new organic substance formed. In the lowest animals, the surface of the body provides for the exchange of gas from the water wherein they live. In a higher stage of development, the surrounding media of water or air are brought into intimate contact with all the elements of the body, by means of special apparatus. Thus in the coelenterates and many worms a special vascular system carries the current of water through the body. In the insects, cylindrical tubes, so-called tracheae, carry the air within their dendritic ramifications from the surface of the organism to its deeper parts. In higher animals, the blood provides for the exchange of gas between the tissues and the surrounding medium. Special organs absorb the oxygen and give off the carbon-dioxide. This external breathing is supplemented by an internal process whereby the circulating blood is brought into intimate contact with the tissues, and thus exchanges the gas with the individual cells. In the animals which live in water, the blood within the gills absorbs the oxygen from the water, and gives off the carbon-dioxide. The

birds and those mammalia which live in the air are provided with lungs wherein the blood performs a similar function. Breathing also takes place to a small degree through the skin and the gastrointestinal tract.

The mechanism of respiration is as follows: Inspiration is brought about mainly through a flattening and downward movement of the diaphragm and through the rising and expansion of the ribs (*Musculi scaleni, levatores costarum et intercostales.*) This concerted muscular action brings about a widening of the thorax. The thorax encloses the lungs in an air-tight cavity. During inspiration they follow the movements of the thorax and the diaphragm passively. The expiratory contraction of the thorax under normal conditions is brought about by the elasticity of the lungs and ribs without muscular activity. In exerted breathing, a number of auxiliary muscles aid the above-mentioned ones.

Flourens' discovery of the so-called respiratory center beneath the *calamus scriptorius* of the rhomboid fossa of the medulla oblongata was up till now the only plausible explanation of the nervous mechanism of speech. This center was called the vital knot (*noeud vital*), because its destruction brought about immediate cessation of breathing and consequent death of the animal. From this center impulses are supposed to emanate down to the branches of the nerves of the respiratory muscles within the spinal cord. It is also supposed to receive various afferent fibers, the most important of which are contained within the air vesicles of the lungs. By the contraction and distention of these vesicles stimulations are supposed to be carried to the breathing center.

Irritation of the sensory nerves of the skin by cold or heat are also supposed to have an alterative effect on the breathing center. The fact that during speech and under other voluntary influences, the type of breathing changes, induced Gutzmann to assume a conductive path between this center and the brain. This vague statement did not, however, satisfactorily explain the complex correlation between breathing and speech.

In order to more thoroughly understand the problem before us, let us first examine the nervous mechanism of animal breathing, as it appears in the light of modern research. Is it really necessary to assume the presence of a regulating center for such a low function as breathing represents, even if the breathing is wonderfully rhythmical? Jacques Loeb, one of the pioneers of modern physiology of the brain, proved that in lower animals, rhythmical,

muscular contractions are easily explained by processes of physiological chemistry alone. In the *Hydromedusa* the swimming bell is surrounded by a nerve ring consisting of ganglia. It was believed that the ganglia are responsible for the rhythmical contractions of the swimming bell. Loeb severed the swimming bell from the nerve ring, and found that the rhythmical contractions continued when the bell was put in a 5-8n NaCl or 5-8n NaBr solution. But if a small quantity of CaCl_2 or KCl or both were added, it stopped its rhythmical contractions. Hence, Loeb believes that it is not the presence or absence of ganglion-cells which determines the spontaneous rhythmical contractions, but the presence or absence of certain ions. Na ions start or increase the rate of spontaneous rhythmical contractions; Ca ions diminish the rate or inhibit such contractions altogether.

The structural peculiarity of segmentation met with in low animal forms exists even in the highest developmental stage. Each segment is dominated by a ganglion wherein reactive powers of both the sensory and motor nerves are stored. By very painstaking experiments on *Limulus*, Loeb proved that if the whole central nervous system with the exception of these ganglia be removed, the rhythmical respiratory activity continues unchanged. He also proved that every ganglion is the seat of an automatic periodic activity. The ganglion that acts first, that is to say the ganglion that acts quickest, stimulates those connected with it nervously and so determines the correspondence of phase.

"In higher animals, the conditions controlling respiration scarcely differ from those in *Limulus*. There is a series of segmental ganglia in the thoracic portion of the spinal cord which sends nerves to the thoracic respiratory muscles of the respective segments. These ganglia extend into the cervical portion of the spinal cord, and the fourth, third and the fifth pairs of spinal nerves gives rise to the fibers of the phrenic nerve which goes to the diaphragm. Chemical changes which are continually going on in the body, or in these segmental ganglia, under the influence of heat (the temperature of the body) produce a periodic activity in these ganglia and consequently in the respiratory muscles. The segmental connection existing between the ganglia and the muscles would bring about co-ordination just as it does in *Limulus*." Loeb also contradicts the statement that the destruction of the so-called vital knot (respiratory center) causes a cessation of respiration by stating:

"Neither is the cessation of respiration in Vertebrates permanent after removal of the *noeud vital* or division of the spinal cord between the *noeud vital* and the third cervical vertebra. Langendorff has made the important discovery that decapitated Vertebrates which have lost the *noeud vital* are still able to perform independent respiratory movements. If one succeeds in keeping these animals alive by introducing artificial respiration until the effect of the shock resulting from the operation has passed off, spontaneous respiration begins again. In destroying the *noeud vital* we perhaps destroy the pathway along which constant impulses are carried to the segmental respiratory ganglia in the spinal cord."

According to the experiments of Goltz and Ewald on the spinal cords of dogs the law of segmental reflexes holds good in this instance. In warm-blooded animals every operation in the vicinity of the medulla oblongata is accompanied by such severe shocks to the segmental respiratory ganglia that the experimental proof is still wanting for the ganglia of the medulla in higher Vertebrates.

It is, however, a fact that a human embryo, especially in the early stages, consists of a series of successive segments, so-called *metameres*, the corresponding parts of the nerves, skin, bones and muscles, we call, *neuromer*, *dermatom*, *skleretom* and *myotom*.

Although there are still some missing links in the chain of experiments to fully prove our assumption, we conclude from the above that breathing in the human being, is also a segmental function. We believe that animal breathing is localized within the ganglion cells of the motor nerve trunks of the respiratory muscles. The intricate histology of the ganglion cells, especially Nissel's tigroid substance, permit the nutritive changes connected with the performance of such a function.

The ganglion cells of the different spinal segments are connected with one another by fibers that become more and more developed with the increased training of the respiratory muscles. By these connecting fibers, cells of different levels may be stimulated by the sensory irritation of ganglion cells below and above their location. These ganglion cells are also connected by special conductive fibers with the nucleus of the *nervus vagus* within the medulla oblongata. This explains the above-mentioned fact that an irritation of the nerve-ends within the air vesicles of the lungs changes inspiration and expiration in a reflexive way. These conductive paths are increased in number and improved in quality through exercise. This is proven by the fact that in the foetus and new-born baby,

no medullary sheath of Ranvier is found. This is only acquired through training. The "Anlage" of these conductive fibers is, of course, inherited. From the ganglion cells of the different motor horns of the respiratory muscles, numerous conductive fibers also go upwards towards the medulla oblongata, and form a connection with the nuclei of the speech muscles. Another set of conductive fibers go from the respiratory ganglion cells through the medulla oblongata up to the brain. These fibers are, however, centrifugal. They originate, as we will see later on, within what we call the articulo respiratory center.

How can we reconcile our statement that breathing is a purely ganglion reflex act with the fact that articulation, depending entirely upon breath, is undoubtedly a higher function? By a rather interesting coincidence, almost simultaneously with the discovery of the respiratory center, a special center for the utterance of sound was established. The localization of this sound center is not agreed upon by the different authors. Cruveilhier, already in 1834, concluded that the articulatory center is localized within the oblongata and the pons. This statement was accepted by Leyden in 1867. Schroeder Van der Kolk localized it within the olives, Jaccoud within the *Système commissural cérébello-bulbaire*. Crowing, quacking, etc., animals continue to utter their inarticulate sounds even after their brain has been removed up to the corpora quadrigemina. Anencephalics and children whose brain has been destroyed during delivery are still producing crying or whistling sounds. These facts induced Kussmaul to localize the center for inarticulate sounds behind the corpora quadrigemina. In order to explain the correlation between this center and the respiratory center, he assumes that the sound center reaches as far down in the spinal cord as the respiratory center does. Relieving that the formation of articulate sounds depends upon the integrity of this center, Kussmaul called it the basal sound center.

It is our assumption that there does not exist such a thing as a center for inarticulate sounds. Within the medulla oblongata originate all motor nerves of the head and terminate all sensory head-nerves. Here we find the nuclei of the *nervi vago-accessorii*, the sensor-motor nerves for respiratory and vocal movements. Compactly spaced in a very small place, we find the motor nuclei of all the nerves providing articulatory muscular movement. Here are also localized the sensory nuclei of the functions of hearing, touch and taste. All these nuclei are connected with one another

by numerous conductive fibers. The *formatio reticularis*, for instance, represents an accumulation of fibers connecting the nuclei of the vagus, facial and phrenicus nerves. Meynert found that the nuclei of the facial, vago-accessorius and hypoglossus nerves are connected with one another and with the *fasciculus arcuatus* and the nucleus of the acoustic nerve by numerous conductive fibers. In addition to this interlacing of the nuclei within the medulla oblongata, we assume that they are connected by special conductive paths with the ganglion cells of the motor nerve roots of the segmental respiratory muscles. Thus the stimulation of the ganglion cells received by reflex from the surface of the body or from the blood is conducted upwards towards the nuclei of the articulatory and vocal muscles within the medulla oblongata. In this way a reflex arc is established between breathing and uttering of inarticulate sounds. Here, too, the "Anlage" of these conductive fibers is hereditary. They become increased in number and increased in quality similar to the fibers before mentioned through constant use of this reflex arc. In this instance, too, their medullary sheath of Ranvier is only acquired after continual exercise.

The first cry the new-born baby utters is nothing but a reflex stimulation of the nuclei of the muscles of vocal and articulatory movement; the sensory part of the reflex is the external irritation (lowered temperature and changed skin sensation) that simultaneously causes the first breath.

Both animal breathing and uttering of inarticulate sounds can therefore be easily explained as reflexes without the assumption of any regulating centers.

We will now describe the changes in the type of breathing that occur when the uttering of inarticulate sounds develop into the articulate language of the human race. The development of articulate speech from the first cry of the new-born baby to the perfect mastering of expressing the thought in words has been exhaustively described in the text-books on phonetics (Kussmaul, Gutzmann, Froeschels, etc.) Suffice it to state that the articulatory movements of the first babbling sounds are reflex impulses that may be compared to the inco-ordinate movements of its little hands and feet that are the preliminary steps for the function of grasping and walking.

Through the aid of the senses of hearing, vision and touch, and also of the muscular sense, the baby first learns to copy and repeat his own (primitive) sounds and gradually those constantly re-

peated by the surrounding persons. Thus through continuous training, first the mechanical and gradually the psychic side of speech is learned. Meanwhile he has learned to change animal breathing into articulatory respiration.

In producing the above-mentioned primitive babbling sounds, there is not only deposited within the brain a picture of the position and tension of the articulatory muscles, but also a reminiscence of the power of breath passing by these gateways of speech during the utterance of the sound. The first consonants the baby uses are P and T. The first words are Papa or Tata. In order to pronounce the "P," it is not enough to press the lips upon one another and to open them. It needs an air current of a definite power to explode the closing of the lips so that the sound of "P" may be heard. The same holds good for the other "occlusives," "fricatives," etc., where the air current has either to push open a closed portal or to rush through a narrow one.

The role the power of the air current plays in the formation of the vowels has not as yet been clearly defined. Scripture gives the following definition of a vowel. He consider it "physically as a vibratory movement, consisting of a series of puffs of more or less explosive form and of one or more free frictional sinusoids (aroused by the action of each puff) whose periods are those of the natural tones of the cavities."

There cannot be any doubt that even in the pronunciation of the different vowels, the power of the air current varies to a certain degree, besides in order to reproduce them in the same pitch, the same power of breath must be expelled from the lungs against the vocal cords put into appropriate tension. In connection with consonants, the vowels change their phonetic properties. The power of breath needed in the pronunciation of the syllable "ma" is by no means equal to that needed to pronounce M and A separate and in succession. The question, therefore, arises as to the localization of the memory of the power of breath needed to articulate the different letters, syllables and words.

May the reproduction of the correct power of articulatory breath also be considered as a mere reflex act? Before we answer this question, we will first consider the localization of the other qualities of speech that must be reproduced simultaneously with the adequate power of breath in order to bring about correct articulation. "The centers for language may be divided into two types, sensory and motor, and are as follows: First, a center for the reception of

the memories of spoken words; second, a center for the reception of the memories of the appearance of objects as seen and of words as written; third, a center for the reception of the appearance of the objects gained through the sense of touch; fourth, a center for the memory of the muscular movements necessary for the performance of articulate speech; fifth, a center for the memory of muscular movements concerned in writing. It may be mentioned, before describing the location of these various centers, that in the great majority of individuals who are right-handed from birth these centers are active only in the left cerebral hemisphere, and that in the left-handed they are active in the right hemisphere only." (Gordinier.)

For convenience sake, we will adapt the Wernicke-Lichtheim scheme, although it does not cover entirely the recent investigations. Within the first left temporal gyrus, the sensory motor center of Wernicke is located, while the motor speech center of Broca is located in the posterior part of the inferior left frontal gyrus. These centers are called cortical centers. The center of the memory of the word sound (Wernicke) is connected by conductive paths with the adjoining auditory center. In a similar way, the center for the muscular memories of speech is connected with the cortical center of the articulatory muscles. From the latter center conductive paths lead downward to the nuclei of the articulatory muscles within the medulla oblongata, while the auditory center leads to the nucleus of the auditory nerve. Both Broca's and Wernicke's centers are connected by numerous associative fibers with what is called the trans-cortex, the "throne of reason and ideas."

It is not necessary for our purpose to consider in our scheme of speech the relation of the center of reading and that of writing with the above described ones.

The most important causes of central disturbances of speech are as follows: Apoplexias, arteriosclerosis, lues, inflammation of the brain, abscesses, etc.

Depending upon the seat of the lesion, we have to differentiate the following types of aphasia:

- (1) Cortical sensory aphasia (lesion involving the sensory speech center.)
- (2) Cortical motor aphasia (lesion involving the motor speech center.)
- (3) Sub-cortical sensory aphasia (lesion between the nucleus of the acoustic nerve and the sensory speech center.)

(4) Sub-cortical motor aphasia (lesion between the nuclei of the articulatory muscles and the motor speech center.)

(5) Trans-cortical sensory aphasia (lesion between the sensory speech center and the trans-cortex.)

(6) Trans-cortical motor aphasia (lesion between the motor speech center and the trans-cortex.)

(7) Intra-centra aphasia (lesion between motor and sensory speech centers.) These are more or less theoretical types of aphasia that do not occur in practice exactly as outlined above. We will, however, not touch upon this subject as it is too far remote from our problem.

Merkel has already considered the following articulatory conditions as indispensable for the formation of syllables:

(1) Sufficient supply of air, and adequate tension of the expiratory air column within the trachea, and the resonance cavity up to the place of articulation. Without this tension, the narrowing or interruption of the expelled, sounding air column where-with the articulation of the syllable commences cannot pass into or return into the sounding vocal chord with adequate accuracy.

(2) Subordination of the consonant muscular action under the vocal action. This is only possible when the tension of the trachea remains approximately the same till the commencement of a new inspiration. The respiratory muscular apparatus must remain at the same tension during the entire expiration; this tension must not be weakened unnecessarily during the act of speech by false pauses between two syllables whereby air is expired without having been made use of, nor by prolongation of the consonant noise.

(3) Observation of a certain rhythm, i. e., the correct succession of the different mechanisms.

These correct observations of Merkel could not be explained until now by any of the numerous schemes of the circle of speech. We will now proceed to a practical demonstration of this theoretical discussion. Let us assume that we intend to pronounce the word ROSE. The impulse from the trans-cortex, the "throne of reason and ideas" will be imparted to the different cortical centers of smell, touch, vision, etc., through this psychic process there will appear before our "inner eye," the picture of what we have been trained to term as a "rose." Simultaneously with the recalling of its color, sensation to touch, smell, etc., the memory of the spoken sound of the word "rose" and of the muscular movements neces-

sary for its articulation, and probably also for writing it, will be revived. At this stage, although we would be able to write the word "rose," it would be impossible for us as yet to articulate it. At this time, we would also be able to understand what someone else means by pronouncing the word "rose," as the memory of its sound has been revived within Wernicke's center through the psychic process described above.

Exception may be taken to this statement on the following grounds: The stimulated motor speech center has at this moment already imparted its impulses to the cortical areas, governing the motion of the lips, tongue, pharynx and larynx; from there, the impulse is immediately conducted to the nuclei of the articulatory nerves within the medulla oblongata. According to the exception taken, the articulatory muscles now brought into play, should perform the correct articulation of the word "rose." The fact is, however, that the speech muscles will assume the position (speech position) they have been trained for in the articulation of this particular word. The result will be a pantomimic expression of the word such as is apparent to an audience witnessing a moving picture.

During this complete psychic act the general body reflex of animal respiration has been unchanged. Through this fact, the pantomimic expression of the word "rose" has been prevented from being articulated and heard. The reason for this is that the power of breath necessary to the articulation of the word "rose" has not been brought into play. Animal reflex breathing has not been changed into voluntary articulatory respiration. The hitherto acknowledged centers of speech are therefore not adequate for the explanation of the entire process of articulation. Disregarding its probable anatomical localization, we must deduct a priori from the above premises, the existence of an articulo-respiratory center within the cortex of the brain. Within this articulo-respiratory center, there is deposited the memory of the action of the respiratory muscles during articulation. The articulo-respiratory word picture thus obtained is due to the centripetal impulses originating from the sensory nerves of the lungs and the respiratory muscles. The exact state of the respiratory tract and the respiratory muscles during the production of the particular power of breath essential to the articulation of the respective word is thus, so to say, registered within the articulo-respiratory center. The centrifugal pathway from the articulo-respiratory center is formed by the innumer-

able conductive fibers between it and the ganglion cells of the respiratory muscles within the spinal cord. These animalo-articulatory respiration fibers pass from their ganglion cells through the medulla oblongata, the pons and the pedunculi cerebri to the articulo-respiratory center. Within the medulla oblongata, we will therefore find an immense accumulation of these fibers. In addition to this, we find here numerous quantities of the aforementioned reflex fibers between the spinal respiratory ganglion cells and the nuclei of the articulatory muscles within the medulla oblongata. Besides, the animalo-articulatory respiration fibers while passing through this region also give off connecting nerve-branches to the nuclei of the articulatory muscles. We can therefore easily understand the mistake which was made by Flourens in terming the place where this mesh-work of fibers is most dense (beneath the calamus-scriptorius) as the respiratory center.

It can also readily be comprehended why this particular place should be called the "vital knot." The destruction of such a network of fibers of vital importance is bound to bring about such a terrific shock that in many instances may lead to death. The above-mentioned animalo-articulatory respiration fibers also form the pathway of the impulses for the voluntary and psychic change of the animal respiration. Thus we can explain the hitherto incomprehensible fluctuations of animal breathing under the influence of emotions.

In our attempt to localize the articulo-respiratory speech center we will be guided by the following considerations:

The motor speech center, was located by Broca in the posterior part of the inferior left frontal gyrus. Closely adjoining it, are the centers for the muscular movements of the larynx, pharynx, face, tongue and lips. This fact induced many authors to the assumption that Broca's center is nothing but the combined center for these muscular activities. The same holds good for the center of writing, which is closely adjoined to the centers of the muscular movement of the arm, wrist, thumb and finger.

As the muscles of speech and writing serve other more primitive purposes such as swallowing, grasping, etc., we may assume that their highest functions, namely those connected with the process of speech, have been crystallized in centers remote from those where their original functions are localized. The localization of the muscles of the trunk and shoulders is not a definite one. Most authors believe that they are chiefly represented at the posterior

third of the upper frontal gyrus and on the median surface of the ascending frontal and parietal gyri. We will, therefore, probably have to locate the articulo-respiratory center at about the middle of the upper frontal gyrus, perhaps somewhat overlapping towards the median side. Experiments on animals and post-mortem findings will in time definitely locate this deductively discovered articulo-respiratory center. This center is, of course, intimately connected by means of conducting pathways with the centers of Broca and Wernicke. If we now add the articulo-respiratory center to the above-mentioned Wernicke-Lichtheim scheme, the process of speech will take place as follows:

Assuming that the impulse to articulate a certain word has arisen within the trans-cortex, it will be immediately carried to the different centers. The abstract idea of the word will thus become invested with all the material qualities of its object. The strongest impulses, however, will be imparted to the centers where the memories of the articulated word are deposited, viz.: of its sound-picture, of the muscular activities and of the articulo-respiratory power during its articulation. These three centers, by means of intricate, associative fibers, stimulate one another, and thereby enhance the co-ordination of their activity. The sensory speech center seems to be the most vibrating one. The memory of the sound of the word to be articulated rises nearer to the surface of consciousness than that of its muscular and articulo-respiratory peculiarities. The impulses are then conducted from Broca's center to the cortical area of the speech muscles, and thence to their nuclei within the medulla oblongata. Simultaneously, the impulses from the articulo-respiratory center travel to the cortical area of the respiratory muscles and from there to their spinal ganglion cells. While the sound-picture of the word rings uppermost in the mind, the speech muscles are set into the appropriate speech positions, the articulo-respiratory air current passes by them in the adequate strength. The establishment of an articulo-respiratory center necessitates a reclassification of the speech disorders of central origin. Basing on the Wernicke-Lichtheim scheme, we will establish the following new theoretical types of dysphasia (we avoid the term of aphasia, as this means the total loss of speech):

- (1) Cortical articulo-respiratory dysphasia (total or partial, permanent or transitory loss of function of the articulo-respiratory center.)
- (2) Sub-cortical articulo-respiratory dysphasia (Total or partial, permanent or transitory interruption of the conductive fibers

between the articulo-respiratory center and the spinal respiratory ganglion cells.)

(3) Trans-cortical articulo-respiratory dysphasia (Lesion between the center and the trans-cortex.)

(4) Intra-centra articulo-respiratory dysphasia (total or partial, permanent or transitory interruption of the conductive fibers between this center and either that of Wernicke or Broca or both of them.)

It is, of course, understood that the central lesions are very rarely restricted to a small circumscribed region. Tumors and abscesses press into different directions, trophic and vascular disturbances usually involve a greater area. Thus the above-mentioned articulo-respiratory dysphasias will be usually combined with one or more symptoms of the motor-sensory aphatic type. The scope of this paper prevents us from describing the symptoms of the different theoretical and clinical forms of motor-sensory aphasias, including the related symptom complexes of Alexia, Agraphia and Apraxia. We will also omit the further discussion of the above described theoretical types of articulo-respiratory dysphasias and will restrict ourselves only to the description of their clinical forms as met with in practice.

The most conspicuous articulo-respiratory dysphasia in the writer's opinion is stuttering. Volumes have been written by the thousands on the etiology and theory of stuttering. We refer those interested in the subject to the works of Kussmaul, Gutzman, Froeschels and Scripture where a complete list of literature on the subject may be found. We will only mention those opinions which pave the way to our theory. Coén, who, by the way, was the first physician specializing in speech disturbance, claimed that stuttering was brought on by a reduction of the volume of breath, secondary to an affection within the medulla oblongata or the spinal cord, for which, however, no anatomical changes could be found. Gourdant and Becquerel think that stuttering is due to a too rapid expulsion of air. Froeschels believes that one of the causes of stuttering is a disturbance of that co-ordination which ought to bring about a correct relation between the power of tension and explosion through the act of speech. Kussmaul states that in the stutterer, the correct formation of syllables is interfered with because the muscular actions of expiration, vocalization and consonant formation are not working in harmony. All authors, of course, describe disturbances in the control of breath as a prominent

symptom of stuttering, while only a few consider this fact as an etiological factor. The writer considers stuttering as chiefly an articulo-respiratory disturbance for the following reasons:

Amongst the cardinal symptoms that are objectively noticeable, tonic or clonic contractions of the respiratory and articulatory muscles and also a faulty economy of breath, play the most prominent role. This fact is proven beyond doubt by breathing records that are taken of the chest and abdomen while the stutterer talks. During the last two years, the writer had the opportunity to examine several hundred stutterers of the Speech Clinic of the Neurological Department, Columbia University, in this way. The records are taken by means of a so-called pneumographic belt and the kymograph. We will first consider the normal animalic and articulo-respiratory breathing curves. Their striking feature is their regularity. In animal breathing, the lengths of the wave for inspiration and expiration is almost the same. The breathing curve of the nose, although not as regular as that of the thorax and abdomen, also shows a symmetry in the rising and falling of the curve. During animal respiration, the air is inhaled through the nose, provided there is not an obstruction. The articulatory respiration is of quite a different type. First of all, it shows the voluntary action of the respiratory muscles during expiration while in animal breathing this phase is an entirely involuntary act due to the elastic recoil of the lungs, exclusively. The inspiration becomes very short, while the expiration is considerably longer. During speech, we inhale rapidly through the mouth that volume of air we gradually use up while we articulate during the expiration. The voluntary control of our breath during articulo-respiratory expiration is due to the impulses emanating from the articulo-respiratory center to the spinal ganglial cells of the respiratory muscles.

The study of the pneumographic records affirms the theories expounded above. Gutzman and Flatau proved that in the crying new-born baby, thoracical breathing predominates. Eckerlei demonstrated by means of pneumographic examination, that in the animal breathing of the suckling thoracical breathing somewhat precedes the abdominal. Besides, in the first years of life, breathing is quite irregular. This affirms our theory of segmental breathing. Through the development of articulate speech more and more conducting fibers are formed between the respiratory ganglion cells and the nuclei of the speech muscles on one hand, and the articulo-

between the articulo-respiratory center and the spinal respiratory ganglion cells.)

(3) Trans-cortical articulo-respiratory dysphasia (Lesion between the center and the trans-cortex.)

(4) Intra-centra articulo-respiratory dysphasia (total or partial, permanent or transitory interruption of the conductive fibers between this center and either that of Wernicke or Broca or both of them.)

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respiratory center on the other hand. In animal breathing, the fibers connecting the ganglion cells of the respiratory muscles with the articulo-respiratory center play the same role as the centripetal fibers of the ganglion motor cells or other reflex arcs. If the conduction of these fibers is interrupted within the spinal cord, their reflexes, for instance, the patellar reflex, becomes exaggerated. These fibers are of a reflex inhibiting nature, while in the normal individual these animalo-articulatory respiration fibers help to regulate the reflex of animal breathing, the latter may be irregular in some articulo-respiratory disturbances where these fibers are interfered with. This may be easily proven by the animal breathing curve of the stutterer. In lighter cases of stuttering, the animal breathing curve may appear to be a normal one, but in quite a number of more pronounced cases, even the animal breathing curves show slight irregular elevations, interruptions, sudden jerks and other deviations from the normal.

The experienced observer may in such instances diagnose the case as one of stuttering without the stutterer having even uttered one sound. During articulatory respiration, the thoracical and abdominal breathing curves of the stutterer become directly pathological, or so to say, pathognomonic. We find the short inspiration and long expiration, such as found in normal speech, replaced by an irregular conglomerate of inspiratory and expiratory jerks, by straight lines indicating the stoppage of breath and by many other asymmetrical undulations. The underlying causes of these uncontrolled interruptions and expulsions of breath are irregular contractions, spasms, sudden rigidities and cramps of the respiratory muscles both of the thorax and of the abdomen. The nasal breathing curve of the stutterer shows during speech characteristic fluctuations, not only in the pronunciation of the letters M, N, and Ng where the air normally escapes through the nose, but with every sound uttered. The cause thereof is the extension of the irregular concussions of breath to the soft palate and thereby to the air space within the nasal cavity.

Let us suppose that through any reason whatsoever (trauma, shock, infections, diseases, etc.) a predisposed person acquires an affection of the articulo-respiratory center or of its associative fibers. This person suddenly notices that he is unable to explode the closed lips with the strength necessary to articulate the letter "B." The same may be noticeable with any other consonant. He, of course, will try to overcome the obstacle by increasing the air-pressure

from the lung towards the closed lips. This attempt to overcome his articulo-respiratory disturbance, when repeated over and over again, finally leads to the tonic and clonic contractions of the diaphragm and the other respiratory muscles, that are the cause of the irregularities of the breathing records of the stutterer. He will also try to overcome this obstacle by "contracting and fixating the muscles of the larynx whereby finally laryngial cramps are brought about." (Scripture.)

When the attempt to direct an adequate articulo-respiratory current of air towards the consonant portals has failed, the stutterer will try to bring about the correct articulation of the intended consonant by concentrating his attention to the speech muscles involved. The contraction of the respective speech muscles will gradually tighten and will last longer, whereby in time, so-called tonic cramps will be brought about. If this attempt fails, a rapid succession of contractions and relaxations of the respective speech muscles will be resorted to, a procedure that through inevitable exaggerations will finally lead to their clonic cramps. At this stage the psychic effects of the described attempts of correcting the faulty articulatory respiration will become evident. "A never-failing symptom is the patient's lack of confidence in his ability to speak correctly. In some cases, the mere thought, 'will I be able to say that word?' is sufficient to make it absolutely impossible for the person to say it. The stutterer always lives with the fear that his 'speech may go back on him.' When the dreaded word is coming, he avoids it by selecting another that will serve just as well. The fear of being ridiculous is nearly always present, also usually a condition of mental flurry. The embarrassment and sad experiences of the stutterer often lead to an abnormal mental condition. The patient is nervous, shy, easily embarrassed, retiring, odd in his ways, sad, etc. In some cases the change does not go beyond an increased sensitiveness. Many stutterers, especially young women and schoolboys, acquire a permanent facial expression that is typical of the profoundest sadness. The thought of suicide is frequent." (Scripture.)

The so-called accessory muscular movements (making of grimaces, contortions of the body, twisting of the head, arms or legs, etc.) also arise through the stutterer's intention to improve his faulty articulatory respiration by compensatory movements of other body muscles. These accessory muscular movements in their initial stage may be compared with the bending forward of

the head, the lifting of the shoulders, the raising of the arms, etc., in difficult animal respiration. We, therefore, have to refute the assumption of Gutzman that the accessory movements of the stutterer are involuntary muscular activities due to a central defect. We would rather accept Froeschel's statement that the muscular exaggerations of the respiratory, articulatory and other muscles are primarily a voluntary act on the part of the stutterer. Through the formation of habit, these exaggerations persist in being and assume the form of involuntary movements. For the same reason, the term of "tonic or clonic cramps" ought to be replaced by that of "tonic or clonic contractions" or by that of "cramp-like movements of tonic or clonic character."

The etiology of stuttering is a manifold one. Whether trauma, shock, fright, infectious disease, age of puberty, speech conflict, etc., may be considered as the etiological factor, in every instance, the affection of the articulo-respiratory center or its connections may occur by direct affliction, through the circulation of toxins, etc. Thus our theory does not contradict those expounded by others. It merely arrives at a different conclusion by assuming the additional premise of an articulo-respiratory center.

The normal function of the circle of speech including that of the articulo-respiratory center has adapted itself to the high level of social intercourse. The senses of hearing, vision, etc., are working under a higher tension during the general conversation in intercourse with other people, than they are when one speaks without an audience. These overwhelming nervous impulses unbalance the articulo-respiratory equilibrium in the stutterer. In singing and ceremonious talking, extraordinary impulses counterbalance the articulo-respiratory instability. Thus, it may be explained why the stutterer when alone or singing or talking ceremoniously, does not show his affliction.

The correctness of our theory is furthermore confirmed by the fact that the treatment of stuttering consists mainly in breathing exercises. The purpose of these is to gain the recovery of the lost control of the articulo-respiratory center.

It is a well-known fact that a center whose function has been lost or pathologically changed, may be stimulated to recovery by the impulses from other centers. Thus in motor and sensory aphasia, the centers of Broca or Wernicke may gradually regain their function by optic, tactile and other stimulations.

This "Anbahnung" of affected conductive paths is also made use of in the treatment of stuttering. Besides the above-mentioned

training for the recovery of articulo-respiratory control, systematic exercises of the articulatory and other body muscles are employed. Furthermore, the will power and confidence of the stutterer is restored by assuring him of the curability of his ailment. He first learns to talk with a singing voice, or an abnormally low or high pitch. He is also told to prolong the vowels, etc. "The principles of relaxation, habit-formation, increasing embarrassment, equilibration, spontaneity, correct thinking, correct enunciation, and subconscious readjustment are also restored to." (Scripture.) Simultaneously a thorough correction of character has frequently to be carried out.

During the last two years, the writer took the breathing records of each stutterer, upon his admission to Mrs. Scripture's Speech Clinic of the Neurological Department, Columbia University. Breathing records were also taken at regular intervals during the progress of the treatment. It is interesting to see the gradual return to the normal of the breathing records of the stutterer, as he improved in his ailment. This fact, too, is an argument in favor of our theory that stuttering must be regarded as an articulo-respiratory speech disturbance.

Another very marked articulo-respiratory disturbance in our opinion is the apparent mutism in deafness. (We do not adhere to the term, so hackneyed, of deaf-mutism. The deaf child, by proper training, can be made to talk.) In the congenitally deaf child, the sensory speech center is undeveloped due to the lack of hearing. Consequently, the impulses normally emanating from this center to the motor speech and articulo-respiratory centers are missing, and these two centers will gradually become potentially underdeveloped. In acquired deafness, there have been stored within the sensory speech center sufficient sound potentialities to provide an adequate stimulation for quite a length of time to the centers of motor speech and articulatory respiration. Articulatory speech may in such cases be kept up indefinitely, if through systematic articulatory and respiratory muscular exercises the stimulation of these two centers is continued, and if the missing function of hearing is replaced by that of lip-reading.

In this affection, too, like in stuttering, the breathing records confirm our assumption of an articulo-respiratory defect. Gutzmann, the master of phonetics, first called attention to the peculiarity of the breathing curve of the deaf. The writer examined quite a number of deaf persons, and found Gutzmann's statement verified.

In acquired deafness, where the faculty of speaking is still preserved, the animal respiratory curve shows no peculiarities. During articulatory respiration, however, considerable variations from the normal are noticeable. The inspirations are extremely frequent. The relation between the length of the inspiration and expiration, also deviate considerably from the rule. If the deaf person repeats the same sentence a few times, the described abnormalities of the breathing curve apparently correct themselves. It seems as if the inhibition at the start had been overcome and the deaf person had regained the easier mode of speaking, as he did when he possessed normal hearing faculties. The deaf child in comparison with the normal child speaks remarkably few syllables with one breath. Evidently much more power is expended in the articulatory movement. This becomes evident through the expiratory jerks of the thoracal articulo-respiratory curve. In the congenitally deaf child, these peculiarities are much more pronounced. The number of inspirations during speech exceeds those during animal breathing in an astonishing way. The thoracal articulo-respiratory curve shows an extremely ataxic character. Gutzmann arrived at the following conclusion: "The later deafness is acquired, the more the breathing curve during speech will approach the normal. We may immediately judge from the breathing curves of a deaf child whether its affection is an acquired or congenital one. The treatment of mutism of the deaf consists of the training of the control of the articulatory respiration together with the well-known exercises of the muscles of vocalization and articulation."

Articulo-respiratory disturbances of speech may occur as concomitant symptoms to any central nervous affection where the seat of the lesion involves the articulo-respiratory center or its conductive paths. There are cases of motor aphasia, bulbar paralysis, and tabes recorded where such symptoms occur as were described in the attempt of the stutterer to overcome his articulo-respiratory disturbance. They can only be explained by a simultaneous affliction of the conductive fibers from the spinal ganglion cells of the respiratory muscles to the nuclei of the articulatory muscles within the medulla oblongata and to the articulo-respiratory center proper. In a few cases of beginning bulbar paralysis, where no paralytic symptoms of the speech muscles were as yet noticeable, the writer discovered on breathing records of these patients, that there were clearly defined articulo-respiratory disturbances.

The scanning speech occurring in a number of central lesions is often a symptom of an interference with the transmission of articulo-respiratory impulses. For diagnostic and therapeutic purposes, it would be therefore advisable to have records of animal and articulatory respiration taken in every case of affection of the central nervous system, accompanied by speech disturbances.

In a case of hysterical aphonia, the records of breathing gave valuable information about the underlying cause. The young woman lost her voice at regular intervals following nervous excitement. The last attack was of six months duration, and no treatment was of avail. The breathing records showed quite irregular articulo-respiratory curves both for the thorax and abdomen. The vocal cords could be closed, they were also brought into the right tension, only the correct power of breath was missing to make them vibrate. By training her to blow out a candle at gradually bigger distances, and making her move by breathing a feather held over the nostrils, she learned to regain some power of breath. A short training in the aforementioned articulo-respiratory exercises helped to restore her voice very soon. Such cases should be termed as psychic articulo-respiratory aphonia.

In the practice of the rhinologist articulo-respiratory disturbances play quite a role. The obstructions within the nose, naso-pharynx, throat and larynx alter the quality of both animal and articulatory respiration to quite a marked degree. The mental picture of the power of breath necessary to overcome the resistance of narrow speech cavities during speech is quite different from the normal. If these obstructions remain unchanged for a length of time, the faulty articulatory respiration, and its consequent speech disturbance may persist even after an operative removal of the obstruction. It is therefore advisable to take records of both animal and articulatory respiration before and some time after each operation. If a return to normal articulatory respiration is not shown within a reasonable time after operation, systematic training of the respiratory and articulatory muscles must be resorted to. This holds especially good for speech disturbances, accompanying hypertrophied tonsils and adenoids.

The articulo-respiratory sensations derived from a cleft palate will produce a certain memory within the articulo-respiratory center. This may prevent the recurrence of normal speech even after a successful operation. Here, too, systematic exercises of the articulatory and respiratory muscles must be employed.

CONCLUSIONS.

There is a marked difference between that type of breathing which serves merely for the conservation of the organism—animal breathing—and the type of breathing that is employed during articulated speech-articulatory respiration.

Animal breathing is a reflex action. The sensory part of the reflex arc goes from the surface of the body to the posterior spinal ganglia and from there to the ganglion cells of the respiratory muscles. The motor ganglion cells of different levels are connected with one another by numerous conductive paths.

The uttering of inarticulate sounds is also a mere reflex action. The ganglion cells of the respiratory muscles are intimately connected by conductive fibers with the nuclei of the muscles of vocalization and articulation within the medulla oblongata. The sensory part of the reflex arc is the same as in animal breathing; it is carried upward to the nuclei of the articulatory muscles by means of these conductive fibers. The hitherto accepted theories of special centers for respiration and the utterance of inarticulate sounds may therefore be discarded.

The change of animal respiration into articulatory respiration is brought about by impulses that emanate from a regulating center within the brain, and are carried to the ganglia cells of the respiratory muscles by numerous conductive fibers.

This special cerebral center, the articulo-respiratory center, must be included within the circle of speech, in order to explain the process of articulation. Within this center, there are deposited the memories of the power of strength employed in the articulation of the different letters, syllables and words. Through the co-operation of this center, the speech-muscles set into the appropriate speech-positions through the impulses of the motor speech-center, will be forced to articulate under the control of the adequate power of breath.

Stuttering and mutism in deafness are the most conspicuous articulo-respiratory disturbances.

Articulo-respiratory speech disturbances may be concomitant symptoms to any affection of the central nervous system.

The taking of breathing records of both the thorax and the abdomen reveals clearly any disturbance of animal or articulatory respiration. Such records should be taken both for diagnostic and therapeutic purposes in each case of central nerve affection

with speech disturbances and also in rhinological cases both before and some time after the operation.

The writer wishes to express his thanks to Mrs. E. W. Scripture and to Professor F. Tilney for the rich clinical material of speech defects placed at his disposal, and for the opportunity of doing phonetic research work in the Speech Research Laboratory of the Neurological Department of Columbia University.

A complete review of the literature on the subject is contained in the works of Kussmaul, Scripture, Froeschel and Gutzmann, to which we refer.

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TUBERCULOSIS OF THE LARYNX WITH SPECIAL REFERENCE TO THE USE OF TUBERCULIN.*

DR. HILL HASTINGS, Los Angeles, California.

During the past ten years in Southern California I have had the opportunity to observe a large number of cases of tuberculosis of the upper respiratory tract and to follow up some tuberculin-treated patients for a considerable length of time. It is hoped that the clinical observations of tuberculosis of the larynx here reported may be of some little value, and that some encouragement may be given to the careful use of tuberculin.

Laryngologists have a better opportunity of watching tuberculous lesions than any other workers in medicine. But, and I hope it is not presumptuous to say so, our observations are of very little value unless we are able to follow up cases for some time in a good tuberculosis sanatorium. For that reason resident physicians in sanatoria should become proficient in laryngological examination. If they took as active an interest in the lesions of the larynx as they do in the lesions of the lungs, the observations that would accumulate would be of greater value than at present.

General Considerations.—Tuberculosis of the larynx is essentially a chronic localized lesion, the result of an infection (and possibly always an autoinfection) of tubercle bacilli; chronic because a certain resistance has already been established.¹ In fact, the active pulmonary lesion, which is generally considered the primary focus from which the lesion higher up is caused, is now considered by many to be secondary to a focus that has been dormant for years, likely since childhood.²⁻³ Many observations support this view.

*Candidate's Thesis read before the American Laryngological Association, at Niagara Falls, Can., June 1-3, 1915.

†I am indebted to the service, in the County Hospital; the Clinic of the Los Angeles Medical Department, University of California, and especially to the service of the Barlow Sanatorium for tuberculous patients.

1—Koch's original experiment (1891) showed that tuberculous guinea pigs, when re-inoculated, behaved differently from healthy guinea pigs in that the lesion from re-inoculation was less active than from a similar inoculation in a control guinea pig,—either healed or tended towards healing, without peri-glandular involvement.

2 & 3—Hammond and Wolman, of Johns-Hopkins, "Tuberculin in Diagnosis and Treatment." "Von Behring found it was impossible to produce pulmonary phthisis in guinea pigs with a single injection of tubercle bacilli, but that repeated injections frequently cause characteristic chronic lesions of the lungs. From these experimental studies Von Behring drew parallel conclusions for man, announcing that pulmonary tuberculosis could develop only in a previously infected individual. With keen insight he placed the date of infection in early childhood."

3—Hamberger in 1907 reports 848 autopsies in children; in 617 of the 848 tuberculosis was not the cause of death, yet 103 of the 617 (17 per cent) showed incidental tuberculosis. Many of these later would develop pulmonary tuberculosis.

Tuberculosis of the larynx is rarely, if ever, primary. The primary focus may be undemonstrable except by autopsy. In view of the numerous positive tuberculin test observations⁴ and confirmatory autopsy records in apparently non-tuberculous patients, a diagnosis of *primary* tuberculosis of the larynx can well be questioned. Certainly a verdict of "not proven," so far as its being *primary* is legitimate, until a searching autopsy is made. From numerous animal experiments, prompted by Koch's original experiment, as well as from close clinical observations, we must look upon a tuberculous lesion of the upper respiratory tract as a new lesion in a patient who has been previously infected and who has acquired a certain degree of immunity.⁵⁻⁶

There is in the secondary lesions a healing tendency, or at the worst, a certain combativeness, that makes the lesion chronic and to a greater or less extent non-destructive, even though the pulmonary condition does not improve. That the mortality in cases of tuberculosis of the lungs with laryngeal involvement is high does not invalidate this statement. Such cases progress to a fatal termination irrespective of the laryngeal lesion and often with that lesion non-progressive, as we all have frequently seen. A hopeless view is not truly correct, at least so far as the lesion in the larynx, pharynx, or ear is concerned.

The Frequency of Tuberculosis of the Larynx.—In Southern California, for obvious reasons, there are probably more cases of tuberculosis, in proportion to the population, than in any other section of the country, with the exception of Colorado or Arizona; and for that reason a higher percentage of tuberculosis of the larynx is seen in a general practice of ear, nose and throat. My case records of tuberculosis of the larynx number 99, in 4,719 ear, nose and throat patients, or 2.1 per cent. That two in every one hundred patients that come to one's office have tuberculosis of the larynx seems rather high. It is likely above the normal. This percentage would be increased if bed-ridden cases seen at the County Hospital, and elsewhere, were added. In the ear, nose and throat clinic, Los Angeles Medical Department, University of California, in

4—Beck, quoted by Hammon and Wolman, made a tuberculin test on 2,505 patients, 1891 to 1897, in the Institute of Infectious Diseases in Berlin, 396 were definitely tuberculous and all reacted; 338 cases were suspected tuberculosis and 86.8 per cent reacted; 1746 patients gave no clinical evidence of tuberculosis, yet 19, or 47.9 per cent, reacted.

5—For example, E. R. Baldwin ("Hypersusceptibility to Tuberculin in Tuberculosis," "Yale Med. Journal," Feb. 1909) quotes experiments made in 1892 by Trudeau: "Animals were made hypersusceptible by inoculations of bird tubercle bacilli and later infected in the eye. Immediately violent reaction followed and the eyes seemed to be doomed. On the contrary they gradually cleared up and healed, while those of control animals, which showed no immediate reaction to the inoculations, gradually became destroyed by caseation."

6—"It is now an accepted fact that tuberculosis confers an immunity as general and as easily demonstrable as do most infectious diseases."—Hammond and Wolman, 1912.

14,042 cases there were 108 cases of tuberculosis of the larynx (0.7 per cent), in the past four years.

In the Barlow Sanatorium there were 38 cases of tuberculosis of the larynx in 743 cases of tuberculosis—5.1 per cent. This percentage is remarkably low (20 to 30 per cent being that more commonly reported) and it is due to the fact that patients with laryngeal tuberculosis are excluded, as much as possible, from that institution.

In the County Hospital where there is the largest number of tuberculous cases, the records are too incomplete to be of statistical value.

As to primary tuberculosis of the larynx, I have never seen a case. Occasionally, patients with tuberculosis of the larynx, and more frequently patients with tuberculosis of the ear, are seen who have been unaware of any tuberculous condition of the lungs and often with negative reports from physicians; but invariably careful examination, or re-examination, by competent chest men, has shown tuberculosis of the lungs, sometimes inactive, often active.

A point worth noting is the absence of tuberculosis of the larynx in children.⁷ I have never seen a case in a child. Tuberculosis of the ear, however, is not so infrequent. The absence of the laryngeal involvement in children is to a certain extent explainable by the fact that tuberculosis in children is less often of the lungs, and more often of the intestines, joints, meninges, glands, etc., and when of the lungs it runs a more rapid course; of the acute miliary character.

An interesting point is the occurrence of tuberculosis of the larynx in patients who have been treated with tuberculin. Bandelier and Ropke claim that "they have seen no new tuberculous laryngitis develop in patients that are treated by tuberculin." (Hammon and Wolman, "Tuberculin in Diagnosis and Treatment.") The latter's comment is "that it is true that the complication occurs with comparative rarity in tuberculin patients." On this point I wish to record two cases where this did occur. *One case*—E. G. H., age 24, Barlow Sanatorium, Sept., 1909, developed typical tuberculous lesions of the epiglottis and vocal band and inter-arytenoid fold. Had had tuberculin for a year before entering the sanatorium and to the extent of getting decided reactions. It is worth noting here that this patient subsequently recovered—case reported later. *Another case*—Mrs. Q., Barlow Sanatorium, developed laryngeal tuberculosis April, 1913, while taking tuberculin in the sanatorium. She had

7—Dworetzky (Annals of O. R. & L., December, 1914) calls attention to this fact and says in 100 children with tuberculosis, treated in the Otisville, N. Y., Sanitarium, he did not find a single case of laryngeal tuberculosis.

had tuberculin for over a year. The laryngeal involvement, however, was inactive; was a mound-shaped infiltration of the interarytenoid fold that did not ulcerate.

Whether or not immunity to the laryngeal complication occurs in tuberculin-treated patients is of great interest and importance; and these cases are reported not so much to controvert the point as to induce others to report their observations.

Our experience has been that commonly noted in regard to the occurrence of tuberculosis of the larynx, that most of the laryngeal cases are second or third stage pulmonary cases with considerable sputum. There have been notable exceptions; some that make one believe that infection of the larynx occurs not from sputum, but from infection by the lymph or blood stream (in tuberculosis of the ear this has been even more often our observation). In one case, F. K., No. 398, Barlow Sanatorium, June, 1914, the pulmonary lesion, although of the second stage, was not very active; frequent examinations of the small amount of sputum raised were negative for tubercle bacilli and only once were a few found; the patient had no fever; the general condition was excellent and there was no pain or soreness, only hoarseness. The laryngeal tuberculosis was that of a third stage case; great infiltration of the epiglottis, followed by considerable ulceration; marked infiltration with edema of both arytenoids, the right one immobile; both vocal cords irregularly infiltrated.

A similar case, Miss S., moderately advanced, second stage, both upper lobes, without cavity, with very little sputum at any time (in two years' observation) and never any tubercle bacilli found: had extensive involvement of the larynx and ulceration in pharynx (two Wassermanns negative). The lung condition entirely cleared up (in 443 days) and the laryngeal and pharyngeal lesions healed. This case will be reported later.

As to acute catarrhal inflammation being a factor in the etiology of tuberculosis of the larynx, there has been in our experience an absence of any history of attacks of acute catarrhal inflammation as a pre-tubercular stage. In the third stage pulmonary cases where there is much sputum with pus organisms, a chronic catarrhal inflammation is often found, as commonly noted. It is plausible that in such cases the resistance of the laryngeal mucous membrane is lowered and invasion by direct contact favored; but in such cases the *lowered general resistance*, from a losing fight against the pulmonary infection, *has seemed to us the factor of paramount importance*. The high percentage of laryngeal involvement found

at autopsy seems rational to interpret this way.⁸ *The absence of any acute or even chronic inflammation as a pre-tubercular stage is especially noticeable in tuberculosis of the ear. Almost invariably the Eustachian tube and tympanum in the early stage are dry. In such cases the otoscopic examination gives the appearance indicative of an acute catarrh, whereas examination of the nose and nasopharynx and Eustachian tube shows them often absolutely normal, the tube being unusually open and dry; the tuberculous infiltration being, for the time being, confined to the drum membrane or the inner tympanic wall without any general involvement of the mucous membrane of the middle ear.*

It is not uncommon in reports to read of pathologic conditions of the nose and throat, such as deflected nasal septa, obstructions from polyps, hypertrophies, etc., being factors in the etiology of tuberculosis of the upper air-passages, in that frequent attacks of catarrhal inflammation of the ear, pharynx, and larynx produce a congested and vulnerable membrane, susceptible to entrance of tubercle bacilli. Such had been my teaching and it seemed rational. Experience, with considerable surprise, has not borne out this view. The absence of history of repeated attacks and also the absence of marked chronic catarrhal inflammation, has been surprisingly noteworthy, not only so far as the larynx is concerned but, to a marked degree, so far as the ear is concerned.

The hoarseness so long noted before actual soreness in swallowing calls the patient's attention to his throat, is not infrequently due to the tuberculous infiltration itself. As before noted, in third stage cases, with much sputum, there is frequently an associated catarrhal inflammation of the larynx and also of the trachea, but many such cases do not become tuberculous and there is good ground for questioning even in these cases, whether the catarrhal inflammation itself, while apparently somewhat a factor, is as large an etiologic factor as has been thought. That nasal pathological conditions do increase the prevalence of catarrhal inflammation of the ear, pharynx, and larynx is not questioned; nor is it disputed that they need correction. The point is that in our experience there has been no notable association of tuberculosis of the upper air-passages and marked previous catarrhal conditions.

The 99 personal case records of laryngeal tuberculosis are analyzed as to parts affected, as follows:

Epiglottis, 32 cases (33 per cent): infiltration alone 14; infiltration with ulceration 18.

⁸—Fetterolf (Ninth Annual Report of the Phipps Institute, Philadelphia, 1915) gives autopsy records of 100 cases dying of pulmonary tuberculosis, in 83 of which laryngeal tuberculosis was found. *THE LARYNGOSCOPE*, Jan., 1916.

Ary-epiglottic folds, 42 cases; infiltration alone 38; infiltration with (demonstrable) ulcer 4.

Arytenoids, 51 cases; infiltration alone 37; infiltration with (demonstrable) ulcer 14.

Inter-arytenoid region; 25 cases; infiltration alone 21; infiltration with ulcer 4.

Vocal band, 22 cases; infiltration 11; infiltration with ulcer 11.

Vocal cord, 40 cases; infiltration 25; infiltration with ulcer 15.

It is worth noting that in this series, tuberculosis of the pharynx was present in 7 cases; mouth, 5 cases; fauces (tonsil or pillars) in 5 cases.

A look at this summary of the 99 cases shows a few interesting things. First: that ulceration was found in a larger percentage in the parts of the larynx covered by thin mucous membrane rather firmly adherent to the underlying cartilage or fibrous tissue. Thus, of the epiglottis there was ulceration in nearly 60 per cent of the cases where that organ was involved; in the vocal band 50 per cent; in the vocal cord 38 per cent showed ulceration. Markedly different is the percentage in other parts of the larynx where there is considerable sub-mucous tissue and a plentiful blood supply. Thus, of the ary-epiglottic folds, 42 cases, ulceration was found in 4, less than 10 per cent; of the arytenoids, 51 cases, ulceration was found in 14, 27 per cent; of the inter-arytenoid region, 25 cases, ulceration 4, 16 per cent.

Frequently the thought occurs to one that there must be ulcerations that cannot be seen with the laryngoscope, being hid by the infiltration and edema and by the impossibility of seeing all parts of the larynx. However, Fetterolf's recent report, above referred to, of 100 autopsy cases, makes one believe *that ulceration does not occur nearly as often as we had thought, especially of the parts where the mucous membrane is loosely adherent and with considerable blood supply beneath the mucous membrane*. Thus, Fetterolf, in his autopsy report, gives percentages from his autopsy findings remarkably close to the percentages in the above series of clinical findings, as follows: Ary-epiglottic fold, 58 cases, only 9 cases ulceration was found, 15½ per cent; arytenoid cartilages, 57 cases, 14 cases with ulceration, 24.5 per cent (in my series-clinical, 51 cases, 14 cases with ulceration); inter-arytenoid space, 51 cases, ulceration found in 4, less than 8 per cent (in my series, 25 cases, ulceration in 4).

On the other hand he found the vocal bands, 42 cases, 18 showed ulceration, 43 per cent; vocal cords, 49 cases, all ulceration except

10, 80 per cent; epiglottis, 59 cases, 35 showed ulceration, 60 per cent, the same as in my clinical series.

As to pain in tuberculous laryngitis, of the 99 cases, 39 had neither pain nor soreness; 20 had slight (not troublesome) soreness; 40 complained of considerable soreness or pain.

It is often surprising to find so little discomfort and often none, in cases where the epiglottis has "melted away," and where considerable infiltration with edema, of the ary-epiglottic folds exists. The deep infiltration of the arytenoids and the inter-arytenoid folds has been the lesion that caused the most pain, in our experience.

The results of the series of the 38 laryngeal cases at the Barlow Sanatorium (the most accurate I have) are as follows:

Died in the sanatorium	13
Discharged, improved (pulmonary), laryngeal lesion—active and advanced—died later	12
Discharged, improved (pulmonary) and died later—laryngeal lesion small and not active	4
Discharged, improved (pulmonary and laryngeal)	3
Discharged, pulmonary arrested, laryngeal arrested	3
Discharged, pulmonary arrested, laryngeal lesion healed	2
Still under observation	1
	38

In 25 of the 38 cases the laryngeal lesion was progressive. In 13 of the 38 cases the laryngeal lesion was not progressive, but was either apparently healing, arrested, or healed.

Tuberculin Therapy.—A great revival of hope in the cure of tuberculosis followed Koch's discovery of tuberculin (1891). The disappointing reaction that followed its use is well known. The bad effects from large doses caused a reasonable prejudice against tuberculin. The failure to obtain any abrupt improvement in pulmonary tuberculosis from small doses of tuberculin caused general skepticism. Extravagant claims have made most of us discredit favorable reports and deterred many of us from giving tuberculin therapy in small doses a fair trial. During the last decade more and more favorable reports from tuberculin in small doses have been made by cautious observers not only in the treatment of pulmonary tuberculosis, but also of tuberculous lesions outside of the lungs. *There is an overwhelming consensus of opinion that tuberculin in large doses is apt to do harm.*

As to pulmonary tuberculosis—the opinion of two of our best, and most conservative, authorities may be accepted as indicative of the general feeling at this time. Trudeau⁹ sums up his statistical paper as follows: "Many years ago, in spite of the general denunciation of tuberculin, I had formed the opinion that tuberculin, when carefully administered, had within certain limits a favorable influence on the

course of the disease, and that the results of sanatorium treatment could be improved and made permanent in many cases by its application. As years have passed I have seen no reason to change this opinion." Baldwin (see reference 5) states: "In pulmonary tuberculosis, at least, I feel inclined to select tuberculin immunization as the goal for treatment." "The superficial tuberculosis—lupus—laryngeal and intestinal ulcerations appear as arrested bacilli that produce lesions at the place of entrance into the body." The literature is full of reports on tuberculin therapy. Most of the reports are of cases of pulmonary tuberculosis; but many of late are of cases of tuberculosis of other organs that have done well under tuberculin therapy. For example, in general surgery, R. T. Morris¹⁰ advocates the use of tuberculin, combined with iodoform in oil injections. Morris states: "One fact, however, is significant, that previous to ten years ago I operated many times in the course of a year for removal of tuberculous glands of the neck, but during the past ten years I have not operated once."

Noteworthy is the report of Hawes and Floyd,¹¹ of 25 cases of tuberculosis of the eye, referred from the Massachusetts Eye and Ear Infirmary, under the observation of Dr. Geo. S. Derby, in which the cures are attributed to tuberculin. C. N. Spratt¹² reports 7 cases, treated by tuberculin, 4 cured, 2 improved and 1 under treatment.

As to tuberculin in tuberculosis of the larynx, much depends upon the pulmonary condition. It is unfortunate that in the majority of cases tuberculosis of the larynx occurs in patients whose general resistance is very low by reason of a long and losing fight against pulmonary tuberculosis. The advanced pulmonary lesion, to a great extent hinders the application of tuberculin to the secondary lesion. Focal reactions in a badly diseased lung might well be dangerous to life while in the larynx, for example, the reaction might not be harmful and, in fact, might prove helpful. Trudeau says, however, that marked improvement has suddenly occurred in patients in the third stage in whom tuberculin has been used.

In the series of 99 private cases above reported it seems impossible to make any comparison that would be at all accurate, between the tuberculin-treated patients and those not treated by tuberculin. Aside from the inevitable incompleteness of many case records, there is one serious objection to any conclusion that might be drawn, namely, that tuberculin-treated patients are usually selected pa-

9—The Therapeutic Use of Tuberculin, "Amer. Jour. Med. Sciences," 1906.

10—R. T. Morris: Non-operative (tuberculin) Treatment of Tuberculous Glands of the Neck, "N. Y. Med. Jour.," Oct. 3, 1914.

11—Hawes and Floyd: "Boston Med. and Surg. Jour.," Jan. 6, 1910.

12—C. N. Spratt: "Journal-Lancet," V. XXXII, 1912.

tients, selected because by their satisfactory lung condition they have demonstrated a certain resistance to tuberculosis.

It seems better to report the tuberculin-treated cases in which the records were the most reliable and complete. With one exception, the following cases are from the Barlow Sanatorium and the tuberculin, of course, was administered by the resident physician.*

Case 1.—S., April 15, 1909; age, 23. Lungs: stage 111, far advanced. Larynx: stage 1, infiltration inter-arytenoid and v. c.; no ulcer; not very active. Hoarseness; slight soreness on coughing. Time of observation, 645 days. Tuberculin began May 2, 1910, —.00001 mgm., 27 doses given in 148 days, up to Oct. 10, 1910; max. dose, 0.5 mgm. Laryngeal lesion May 4, 1910, remained as one year before, did not progress. October 10, 1910, larynx better, less of the nodular swelling of the cord. *Result:* Lung condition not improved, larynx improved.

Case 2.—H., September 28, 1909; age 26. Lungs: stage 111, moderately advanced; sputum positive. Larynx: stage 111, moderately advanced. Ulceration of epiglottis and of right vocal band, with moderate infiltration; infiltration with superficial ulceration of inter-arytenoid fold. Soreness on swallowing and hoarseness (6 months). Time of observation, 552 days. Tuberculin began—dose 0.00001 mgm. Bouillon filtrate, November 8, 1909, continued to October 31, 1910, 53 doses in 357 days; max. dose, 2.1 mgm. Within four months decided improvement in the larynx was seen; the ulceration had cleared up, the granulation surface more smooth and evident healing taking place. In six weeks more, April 12, 1910, the ulcers were healed. The lung condition cleared up gradually. *Result:* Discharged, lung condition arrested; larynx healed. Two years later, April 30, 1912, was apparently entirely well; in active business life in San Francisco. This patient had taken large doses of tuberculin before he came to the sanatorium, for seven months; tuberculin O. T. up to 20 mgm. and got decided reactions. *Remarks:* In this case there was considerable ulceration of the epiglottis, the ulcer being about 1 cm. in diameter. There was a ragged ulceration of the upper surface of the vocal band. While the lungs showed 111 stage, moderately advanced, general condition of the patient was good and he was deemed suitable for tuberculin injections. The larynx condition was also 111 stage and was of the type that usually progresses. *Recovery has apparently been complete.*

Case 3.—J. R. R., March 5, 1910; age 32. Lungs: stage 111, moderately advanced. Larynx: stage 11, moderately advanced. Epiglot-

*I am indebted to Drs. W. Jarvis Barlow, R. L. Cunningham, R. S. Cummings and W. C. Klotz, for the notes of the tuberculin cases.

tis and ary-epiglottic folds normal; slight red infiltration of the arytenoid and inter-arytenoid space; ulceration of the right vocal cord; infiltration of both vocal bands without ulceration. No soreness on swallowing. Hoarseness for 6 months. Laryngeal condition of itself not severe; no discomfort. Time of observation, 316 days; tuberculin 199 days; 28 doses of B. F.; max. dose, 9 mgm. Patient died January, 1911, from severe hemorrhage. Larynx lesion was not progressive and at no time was there any discomfort on swallowing. Patient was up and around when severe hemorrhage began.

Case 4.—F. S., May 27, 1912; age 32. Lungs: stage 111, moderately advanced. Larynx: stage 111, moderately advanced; destructive ulceration of the epiglottis, infiltration and ulceration of the arytenoids; infiltration of both ary-epiglottic folds with ulceration on the right side of pharynx. Vocal cords and vocal bands not affected. History of pain on swallowing since June, 1912. No history of syphilis; Wassermann examination, negative. Time of observation, 443 days. Treatment: for 3 months patient progressively grew worse; treated with formalin applications, curettement of ulcers, cleansing treatment and powder of iodoform, orthoform and sterate of zinc. For two months was given protiodid of mercury, $\frac{1}{4}$ gr., 4 to 5 a day. Tuberculin began September 3, 1912; 0.00001 mgm. and continued to January 3, 1913. October 11, tuberculin was increased from last dose on October 6, of .0006 mgm. to .200 mgm. of bacillen émulsion. Patient seen following day. October 12, showed a *marked focal reaction of the ulceration of the pharynx and larynx*. Nov. 15, .1 mgm. given and *marked stick reaction*. At this time the symptoms of the throat had all disappeared, *ulcers had apparently healed*. Tuberculin stopped until December 9; began again with 0.001 mgm. and increased gradually up to .03 mgm., which again produced stick reaction. Before ulceration healed, focal reaction occurred after two or three injections of tuberculin. On October 12, the first focal reaction was rather severe, the swelling around the ulceration was markedly increased; by October 25, swelling had decreased rapidly and the ulcers cleared up markedly. Healing took place rapidly after this. She had no other treatment after tuberculin was begun. Patient was discharged from the sanatorium, lung lesions arrested and larynx apparently healed. April 27, 1915, have seen patient frequently during the last two years—has remained entirely well both as to lungs and throat. She is busily occupied as a nurse. *Remarks:* The mercury was given in this case despite two negative Wassermann reaction, on the bare chance of there being mixed infection

and the ulcerations possibly being specific. It did not look specific to any of the laryngologists who saw the case. The mercury was not pushed and it was stopped because it was apparently doing no good.

Case 5.—Mrs. Q., March 27, 1913; age 29. Lungs: 111 stage, moderately advanced. Larynx: stage 1, incipient. Infiltration of the inter-arytenoid region developed one year after admission to the sanatorium, during all of which time tuberculin was being given. Infiltration was mound-shaped, firm in appearance and did not ulcerate. Hoarseness developed, but no soreness or pain; slight interference with movement of the arytenoids. Time of observation, 1,005 days. Tuberculin was given for 389 days; 78 doses, up to 2 mgm. Bacillen Filtrate Comp.* Focal reaction noticed after .6 mgm. After injection of 2 mgm., had both focal and general reaction. This dose was repeated and again a focal and general reaction. A normal salt solution injection was given (for purpose of control) and no reaction. Another injection of .2 mgm. was then given and marked focal reaction in the larynx appeared,—all tuberculin was then stopped. Patient was discharged, lung condition improved, general condition apparently excellent, laryngeal lesion much smaller and not troublesome. April, 1915, patient has been active and well since discharged from sanatorium; no return of trouble in the larynx. *Remarks:* This was one of the cases reported elsewhere in the paper where laryngeal lesion developed during the giving of tuberculin. It was an inactive lesion and grew smaller under subsequent treatment.

Case 6.—W. H. A., August 24, 1914; age 34. Lungs: 111 stage, moderately advanced. Larynx: epiglottis showed infiltration with ulceration $\frac{1}{2}$ cm. in diameter. Arytenoids, slight infiltration; pain worse at night, hoarseness. Time of observation, 183 days. Tuberculin B. F. Comp. for 146 days; 38 doses; .01 mgm. max. dose. Had focal reaction larynx after .008 mgm. Discharged, February, 1915; lung condition improved; general condition good; laryngeal lesions improved, but not entirely well; no pain or soreness.

Case 7.—Mrs. A., September 10, 1914; age 39. Lung condition moderately advanced, stage 11. Laryngeal condition, stage 11, partially healed. Laryngeal lesion dates back $4\frac{1}{2}$ years; developed ulceration left vocal cord in 1910, in Colorado. At that time being treated by Dr. Gerald Webb, Colorado Springs, for pulmonary tuberculosis. Diagnosis of laryngeal lesion made by Dr. Frank L. Dennis. Was treated at that time for five months with tuberculin. Hoarseness and soreness in the beginning, but grew better. One

*Bacillen Emulsion, 2 parts; bouillon filtrate, 5 parts.

and a half years ago soreness again developed and hoarseness has been worse. Laryngeal condition: epiglottis, arytenoids, ary-epiglottic folds normal; lesion confined to vocal cords; right vocal cord infiltrated; pale red; not ulcerated. L. v. c. shows loss of substance, posterior one-third (at seat of former ulcer)—no ulceration is now apparent—gives the appearance of ulceration in the past that has healed. L. cord somewhat lame. L. arytenoid while apparently not infiltrated, is slightly impaired in its movements.

Tuberculin begun (Dr. Walter Barlow) September 10, 1914; .0000001 mgm. bacillen filtrate, increased up to 1 mgm. January 15, 1915; increased again up to 10 mgm. by February 8, 1915; this dose repeated four times. Had 39 injections during the six months. General condition has remained good; no loss in weight; no temperature over 99.9; lung condition quiescent; fibroid in character. *Remarks:* In this case the laryngeal lesion dates back over five years. Ulceration of the left vocal cord, which was present at that time, apparently healed and has remained healed. Infiltration right cord decreased markedly—color almost back to normal. has been an inactive lesion and has almost, if not altogether, subsided. There has not been sufficient time elapsed as yet, to pronounce the case well.

Case 8.—F. K., June 4, 1914. Lung condition moderately advanced, 111 stage. Laryngeal condition moderately advanced, 111 stage. Epiglottis shows ulceration with considerable destruction—left half epiglottis almost destroyed; right half shows a round, swollen stump; infiltration with edema. The ulcerated left half has healed in places. Both arytenoids infiltrated, right one markedly so—right arytenoid almost immobile, as is also right cord. Both vocal cords infiltrated irregularly, thick and red. Little or no soreness in spite of extensive laryngeal lesion. Hoarseness dates back six months. General condition excellent; appetite is good—eats normal amount of food without any trouble. No history of syphilis—Wassermann reaction, negative. Tuberculin begun August 28, 1914, with .005 mgm. bacillen filtrate comp.—rapid increase without any reaction either general or focal, without any rise of temperature. (Same tuberculin used on other cases in the sanatorium has given the normal reaction.) The unusual tolerance to tuberculin induced further increase of dose. In December, 1914, took 220 mgm. of tuberculin without any reaction, focal or general. (10 mgm. is usually the max. dose for focal reaction.) Skin reaction (tuberculin) quickly positive. Second Wassermann reaction was negative. *Remarks:* This patient is still under treatment (May, 1915). No further extension of the laryngeal lesion, but no marked

improvement,—no discomfort. Lung condition is satisfactory—small amount of sputum, only occasionally bacilli. It is too early to give the effects of tuberculin in this case. Case is reported because of the quiescent character of a lesion that looks active and troublesome and also *because of a marked tolerance to tuberculin.* (January, 1916, laryngeal lesions have reduced at least 50 per cent since May, 1915; absolutely no pain or soreness. Voice much improved.)

Conclusion.—As to tuberculin, it should be said that experience with tuberculin-treated cases is yet too small and the results too much clouded by the effects of other remedial agents to enable anyone to make positive statements as to its efficacy. However, one cannot help but be prejudiced favorably by the results as shown in the Barlow Sanatorium cases. Of the eight patients with laryngeal tuberculosis, treated with tuberculin, five are living, two have been healed for over two year; two are classed as "Improved," lesions quiescent (inactive infiltration) and not troublesome, both at work; and one case is still under treatment, lesion not troublesome, general condition excellent. Three of the eight cases are dead. One (Case 3) died of hemorrhages; the laryngeal lesion was not progressive and was not troublesome. The second case had infiltration of the v. c. and inter-arytenoid space; was observed for 1½ years; did not ulcerate, became smaller and was never troublesome. The third case showed no change under tuberculin. Thus in the three dead cases the laryngeal lesion did not play an important part. While these cases were selected cases so far as the general condition was concerned, they were all second or third stage (pulmonary) cases, with marked laryngeal involvement. (In two cases with considerable ulceration.)

In several cases not observed during the tuberculin treatment but the healed laryngeal lesions seen, the same favorable impression was created, as in the Barlow cases. But it is deemed best to report only those cases that were directly under our observation for a considerable period of time and where the amounts of tuberculin and number of doses were known, and the progress of the disease watched. A personal belief in the efficacy of tuberculin has thus resulted.

It is felt that tuberculin-treated cases should be reported that in time we may be able to judge more correctly the value of tuberculin therapy. The good results deserve reporting for they at least lighten somewhat the gloom that overshadows our hopes in treating tuberculosis of the larynx.

924 Trust and Savings Building.

MALIGNANT HYPERNEPHROMA OF THE ETHMOIDAL REGION.*

DR. H. ARROWSMITH, Brooklyn, N. Y.

The clinical history herewith presented is entirely unique in rhinological literature. For that reason I venture a few introductory remarks on the general characteristics of hypernephroma and its metastatic proclivities. These observations I have culled from a number of sources—most freely from the article by Hugh Hampton Young, in Osler's *Modern Medicine*. Apparently absolutely nothing definite is known about the etiology of these curious tumors, so that for the present, we may assume that they are of embryonal origin. "Study of the cases in the literature reveals very little evidence that trauma—or anything else—is a real etiological factor."

Clinical reports seem to show that the male sex in the sixth decade is most prone to manifestations of the disease.

Present conceptions of the pathology are apparently united in considering it due to aberrant adrenal tissue. The tumors were first accurately described by Grawitz in 1883. He said that in certain cases it resembled respectively adenoma, or sarcoma, or carcinoma. Later Garceau stated endothelioma might be considered a more appropriate designation. Other authors have suggested "mesothelioma." "Histogenetically it is probably sarcoma."

Quoting from Dr. Murray's report on my case: "Since it is now held that the adrenal cortex is derived from the same 'anlage' as the kidney, some of these tumors may originate in the kidney from misplaced adrenal elements—hypernephroma, while other are probably derived from the kidney itself—nephroma."

The site of the primary lesion is ordinarily in the kidney. Thence it has a tendency to metastasize, which is second to that of none of the concededly malignant new growths. Deposits have been found in the brain, bronchi, heart, liver, intestines, omentum, skin, uterus, urethra and various parts of the bony skeleton. The brain metastases have given rise to Jacksonian epilepsy. (Collins and Armour, *Am. Jour. Med. Sciences*, November, 1914.)

The treatment is entirely surgical.

In addition to the above enumerated locations where metastases have been observed, there are in the literature only two instances in which the air passages, above the lungs, have been involved.

Menzel (Frankel's Archiv., Vol. 26, p. 265) relates the history of a patient from whose larynx he removed a pedunculated tumor,

*Read before the New York Academy of Medicine, Section on Rhinology and Laryngology, December 10, 1915.

which showed the histological characteristics of hypernephroma. The patient died three months later from "inanition." As no autopsy was allowed, the site of the original lesion was undetermined, there being no other than rather indefinite skiagraphic suggestions of disease of any internal parts.

Hypernephroma at base of tongue. Coenen: *Berlin Clin. Woch.*, September 14, 1914. The patient was a woman of 62, who had a circumscribed tumor about the size of a walnut at the base of the tongue. Wassermann negative—no abdominal growth discoverable. Coenen removed the tumor by lateral pharyngotomy after resection of the lower jaw, under local anaesthesia. The woman

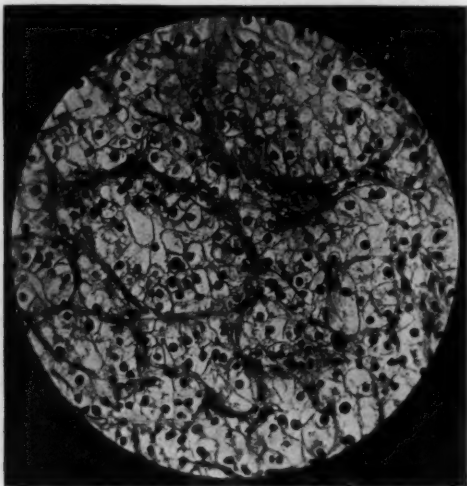


Fig. 1. Microscopic section of tumor (lower magnification).

recovered from the operation and no mention is made of her subsequent career.

The growth was a typical hypernephroma.

Sometimes resemblance to normal adrenal tissue is more striking in these metastases than in the original growth.

E. A. Male, colored, 56, years of age, a native of Panama, entered my service at the King's County Hospital in July, 1915, stating that for some time he had had a decided obstruction of the left nostril and more recently repeated attacks of profuse bleeding from that side. He was a well developed man who, aside from several injuries, had never been sick. His urine contained a few hyaline casts, no other morphological elements—no albumin, no sugar. A Wassermann was negative.

In my absence, my assistant, Dr. Marion E. Pirkey, made an examination of his nose and found a tumor in the left nostril which he removed by the cold snare. A very profuse immediate hemorrhage necessitated tamponing. A few days later being apparently convalescent, the patient was allowed to go home.

The tumor, somewhat tardily submitted to our pathologist, Dr. Terry, elicited the following report: "The specimen measures 2.2 x 1.7 x 1.2 cm. It is yellowish in color, quite brittle and looks waxy. * * * Microscopically it suggests the appearance given by hypernephroma."

On receiving Dr. Terry's report, September 4, I sent for the

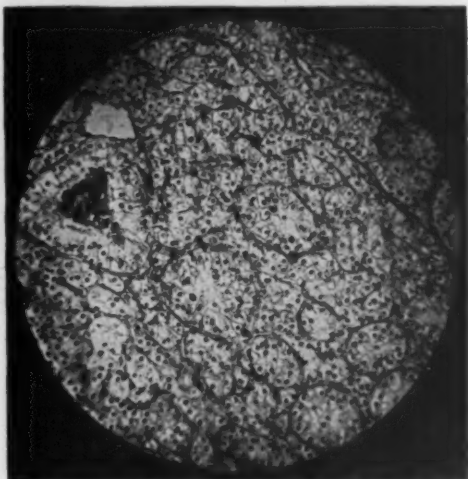


Fig. 2. Microscopic section of tumor (higher magnification).

patient and admitted him to my service at St. Peter's Hospital. During the interval between his discharge and re-admission he suffered several profuse attacks of bleeding.

A careful physical examination showed a very distinct mass in the upper right abdominal quadrant, and enlargement of a number of superficial glands in that region; many disseminated areas of consolidation in both lungs; a right supra-clavicular mass of the size of a small hen's egg.

Repeated examinations of the morning sputum failed to reveal tubercle bacilli. There was no hematuria nor occult blood in the urine which was frequently looked at. For the next few weeks irregularly recurrent and very profuse nose bleeds diminished

the hemoglobin to 30, from which point it would slowly rise until another hemorrhage reduced it again.

Rhinoscopic examination revealed in the left nostril, a mass of, to me, unfamiliar appearance, most plainly visible on posterior view. I determined on a complete exenteration of the left nostril in the hope that the stopping of his hemorrhage might enable him to react sufficiently for further treatment.

On October 8, under oil-ether colonic anaesthesia, after preliminary ligation of the left external carotid artery by Dr. F. C. Paffard, who immediately afterward removed the right supra-clavicular mass, assisted by Drs. Imperatori and Pirkey, I exposed the left nostril by a lateral rhinotomy after Moure's method, and removed a friable yellowish mass of material which had involved and destroyed the entire left ethmoid region, and the inner wall of the orbit.

The bleeding from the field of operation was very profuse in spite of the external carotid ligation, and equally so where Dr. Paffard removed the supra-clavicular tumor. For this reason, I believe, the patient, already greatly reduced by his previous loss of blood, succumbed three hours after leaving the operating room.

The nasal and supra-clavicular tumors were identical in gross appearance. Unfortunately, no autopsy was allowed.

REPORT BY DR. A. MURRAY.

Since there was no difference in the pathological histology of the three tumors in this case, a description of the growth from the nose will answer for all three. Microscopically, the cut surface of the tumor presented a brownish-yellow color. Microscopically, the tumor conforms to the type of hypernephroma known as "tubular-perivascular"—resembling somewhat a columnar carcinoma, with ramifying spaces lined with a single layer of cells, irregularly cubical or columnar.

The stroma consists of thin-walled vessels which run between the tubules or spaces. The individual cells in this type of tumor are large, globular, with distinct outlines, a well-marked nucleus and clear cell-body. The cells seem to be swollen, the protoplasm is very pale and vacioles are occasionally seen.

The most characteristic feature in the structure of this type of hypernephroma is the perivascular arrangement of the cells, which are seen to be in close contact with thin-walled blood vessels.

These tumors are usually very vascular and metastasis occurs through the blood-stream.

170 Clinton Street.

THE CONTROL OF HEMORRHAGE IN MORE EXTENSIVE OPERATIONS ON THE NOSE AND JAWS.*

DR. L. W. DEAN, Iowa City, Iowa.

Success in the major surgery of the nose and jaws is dependent primarily upon two things: first, the control of infection, and second, the prevention of shock. The control of hemorrhage is one of the most important factors in the control of shock. The control of hemorrhage is not only important so far as shock is concerned, but with a comparatively bloodless field a much better operation can be performed. Again, a proper control of hemorrhage will prevent many cases of post-operative pneumonia. With these two conditions, control of infection and prevention of shock successfully met, a certain number of selected cases of malignant growths in the nose, throat, or jaws may be successfully combated. There should be little danger of death resulting from the operative procedure even when extensive operations are necessary.

In 23 cases of removal of the superior maxilla or of one-half of the mandible I have had but one death directly the result of the operation. That was in a case where the superior maxilla was removed and a dissection of the neck performed at the same time, a procedure that I would not now attempt. The loss of blood, together with the length of time necessary for the two procedures combined is frequently too great for the resistance of the patient.

When there is involvement of the glands of the neck most operators prefer to dissect out the neck first and operate upon the primary lesion second. I prefer to operate upon the primary lesion first and do the operation upon the neck second. At the time of doing the primary operation if it is a major operation about the nose, throat, or jaws, I usually ligate one or more vessels in the neck and at the time of this ligation a number of glands are removed for microscopical examination. The most innocent-looking glands may be found to contain malignant cells on careful microscopical examination. This gives us at a time shortly following the first operation information regarding the condition of the neck. I have found that in three or four weeks following the first operation the patients are in condition for the dissection of the neck. This has been my procedure for five or six years, and has been a most satisfactory one.

The question of control of hemorrhage is not confined to the ligation or compression of the larger vessels. To get the best possible results, our operative procedure must be varied, and everything possible done in every way to help control the hemorrhage and

*Read before the Middle and Western Sections, American Laryngological, Rhinological and Otological Society, St. Louis, Feb. 22, 1916.

hasten the operation. Early in the operation the smaller peripheral vessels are seized with hemostats. Usually some time later in the operation it is necessary to use pressure, hot water, etc., to control hemorrhage by seepage. It is advisable to ligate the smaller vessels while this hemorrhage is being controlled and in this way save a little time.

The performance of the operation in two steps, removing the primary lesion in one, and the infected glands in another, is a procedure for the control of hemorrhage. In removing a superior maxilla or half a mandible, when it is necessary to invade the palatal or tonsillar region it will aid very much in the control of hemorrhage if a tracheotomy is performed and the pharynx packed. I can get a much better result by doing a careful tracheotomy as the first step in such an operation, making the opening in the trachea just above the isthmus of the thyroid, and just large enough to allow the insertion of the tube, all the vessels in the neck wound being carefully ligated, and by removing the tube just as the operation is completed. There is very little loss of blood or shock from such a procedure, and it leaves the upper field open for work without bothering about getting blood in the throat. The anesthetic can be given with little trouble; secretions and blood in the pharynx do not interrupt the operation; and the operation can be done much more rapidly. I doubt if there is much more danger of pneumonia because of the tracheotomy if the tube is left in only during the time consumed in operating.

When a preliminary tracheotomy has not been performed there have been times when I have found it necessary to do a rapid tracheotomy after the patient had developed a certain amount of shock because of blood or secretions in the pharynx. Again, when operating and it is not necessary to do a preliminary tracheotomy the position of the patient should be such that blood will not get into the throat. An abundance of hot water and a large electric cautery should always be at hand for the control of deep hemorrhages and for seepages. Not to control hemorrhage, but to control the shock from hemorrhage providing the blood is lost, apparatus for hypodermoclysis, stimulants, etc., should be arranged for in advance in order that no time is lost in applying them. When the patient does seem hopeless from loss of blood and shock, an effort to resuscitate should be kept up until the last minute and occasionally a patient that lingers for an hour or even for two days in what is apparently a hopeless condition, will recover.

The most essential condition in the control of hemorrhage in major operations is to have a corps of assistants who are associated

with the operator in numerous operations so that everything for the control of hemorrhage is done speedily and with precision.

The compressing or the ligating of a larger vessel will not give a bloodless field; but the field, if the proper vessel is blocked, will be so bloodless as compared with what it was when the operation was done without compression or ligation that I doubt if any of us would care to return to the old method of operating. I certainly will never forget the flow of blood which I had ten or twelve years ago when a superior maxilla was removed and big tampons that had been soaked in hot water were hastily thrown in the wound.

Careful cleaning out of the sinuses in the neighborhood of the superior maxilla which we realize to-day is so essential for the success in removal because of a malignant growth, was quite impossible because of the condition of the patient. Certainly the mortality rate following the major operations has greatly decreased with the control of hemorrhage by ligation or compression.

I have had no experience with the ligation of the large vessels on each side of the neck. The ligation on one side has, with the exception of one case, proven satisfactory. In this one case the common carotid was compressed with poor control of hemorrhage. This case will be mentioned later.

The opening in the neck made for the ligation of the vessel should be closed by deep sutures of catgut. In the last few weeks I have tried, after closing the skin suture with continuous catgut, placing over the wound a dressing of cotton and colodion and allowing it to thoroughly dry. I have had opportunity of trying this in but one case. In this case the wound was entirely covered throughout the operation and there was no opportunity for infection from secretions from the mouth or nose or from the operator's hands.

Since the work of Schoenborn, in 1896, and the work of Crile, as reported in 1902, we have had before us the possibility of temporary compression of the large vessels or ligation. The question of compression or ligation of the common carotid in operating upon the nose or jaws is perhaps one to which we should give attention. Personally I doubt the necessity of ligating or compressing the common carotid for such operative procedure. Because of the return flow down the internal carotid and up the external carotid I doubt if it is as efficacious as the ligation of the external carotid or some of its branches.

Dr. Crile¹ says that in atheromatous subjects presenting a high blood pressure he has seen marked hemorrhage, even pulsating hemorrhage, from the branches of the external carotid when the common was closed. This was easily demonstrated to be due to

the passing of the blood of the opposite artery through the brain, causing a reverse stream through the internal carotid of the clamped side to the bifurcation of the common and up the external carotid.

In one case where I compressed the common carotid hemorrhage was not controlled. The patient was not an atheromatous subject. We should get away from the idea that compressing or ligating of the common carotid is a certain procedure for the control of hemorrhage.

I have ligated or compressed the common carotid in only two cases. One was a case where the ligation was performed for an arterio-venous communication between the cavernous sinus and the intracranial portion of the carotid. This ligation was performed upon a young man not of the age at which we usually find the malignant growths of the nose and throat, and was without any bad results. The patient secured a good result so far as the pulsating exophthalmos was concerned, for which the operation was carried out. The second case was one where I compressed the common carotid in a patient where it was necessary to remove the superior maxilla together with an extension into the soft palate. In this case, on exposure of the tissues of the neck I found that the common carotid divided very high up; that the superior thyroid was given off from the common carotid; that the facial artery left the external carotid shortly after the bifurcation; and the lingual was given off from the facial.

As we had here a case where there would be an opportunity for the formation of a thrombus and embolism in the internal carotid I felt it advisable to use the Crile clamp and compress the common carotid rather than ligate or compress the external carotid. In this case it was necessary to continue the compression for a short time after the patient left the operating table because of the intense shock which had made it important that no more blood be lost. This patient was one that was exsanguinated previous to the operation. Much more blood than usual was lost at the time of the operation and there was a condition of profound shock from which, however, the patient recovered, but had following the operation a hemiplegia which almost entirely disappeared in the course of a few weeks.

De Schweinitz and Holloway² in a little pamphlet on Pulsating Exophthalmos, have reviewed the literature in connection with fatalities following the ligation of the common carotid. The death-rate in various series of operations as reported by them ranges from 4 per cent to 15 per cent. If these ligations are performed at a period of life at which we usually have the malignant growth, the death-rate will undoubtedly be higher.

Crile¹ says that on account of the high percentage of cerebral softening in the cancer period of life, permanent closure of the common carotid should be avoided. Proper closure of the vessel should be attended with little more risk of thrombosis or embolism than closure by a tourniquet or pressure applied to the skin. This part of the technique must be performed with absolute gentleness, the lumen merely being closed and the walls not compressed.

In my other cases where it has been necessary to ligate the larger vessels the external carotid has been ligated. In three cases where I have found it necessary to remove one-half of the mandible I have found no indication for the ligation of the larger vessels. The hemorrhage can in this case be easily controlled by ligature of the smaller peripheral vessels and by ligation of the facial where it crosses the angle of the mandible.

The danger in ligating the external carotid is the formation of a thrombus which extends to the bifurcation of the common carotid and forms an embolism which is carried up to the brain.

In Scudders' *Tumors of the Jaw*,² he reports two fatalities in 100 cases of ligation of the external carotid. These two fatalities occurred in cases where the ligature was placed low. If the ligature is placed above the superior thyroid, I doubt if there is much risk. The temporary compression of the external carotid I have had no experience with. I would much rather ligate high up above the superior thyroid or above the lingual if it was given off from the external carotid, and sew up the wound and get it covered and in this way avoid infection of the neck wound while operating upon the nose or mouth than to use the temporary compression. In removing the superior maxilla I like to ligate below the facial as it helps in the control of superficial hemorrhage and the collateral circulation with hemostats and ligatures. When ligated below the facial, it is still necessary to ligate a number of smaller peripheral vessels.

I have never had a tonsillar hemorrhage where it was necessary to ligate a vessel in the neck. The ligation of the external carotid or the facial would not control the blood supply to the tonsil from the ascending pharyngeal. I am told, however, by Doctor Prentiss, that this is only rarely of any importance, and the ligation of the facial or the external carotid should be sufficient.

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State University of Iowa.

A CASE OF VON MIKULICZ'S DISEASE.*

DR. SIDNEY L. OLSHO, Philadelphia, Pa.

Definition: In the case described by von Mikulicz in 1888, there occurred a group of symptoms which did not seem to fall under any then-existing classification, there being characteristic, symmetrical, chronic, non-painful enlargements of the lacrimal and salivary glands, not associated with any demonstrable systemic disease.

Several hundred cases have been reported since that date and there is no doubt that there have been many more, unrecognized or unreported.

Location of Lesion: In von Mikulicz's historical case, all of the salivary and both of the lacrimal glands were involved. Many cases are reported affecting only the lacrimals, only the parotids, only the submaxillaries or even only the sublinguals. A few authors try to drag into this category cases with the involvement of only a single gland, a lacrimal or a parotid.

In some cases there is also enlargement of the secondary salivary glands of the hard palate, of those at the under-surface and of those at the lateral aspect of the posterior portion of the tongue.

The tumors are firm, smooth, free in the tissues and painless or but slightly tender.

The spleen is enlarged in some of the reported cases. There is no enlargement of the lymph nodes.

Hypertrophied tonsils and adenoids are present sometimes.

The blood-picture is normal in most cases, but quite a number developed typical leukemia and pseudo-leukemia.

Etiology: This is obscure. By some the disease is said to be "idiopathic" and compared to hypertrophy of the tonsil and adenoids.

Many authorities attribute the disease to infection by buccal or conjunctival bacteria. Von Mikulicz and his followers trace the infection from the conjunctiva to the lacrimal gland, thence by way of the lacrimal duct to the buccal mucous membrane and salivary glands.

In a case said by one author to be congenital, there were several other instances in the same family.

*Presented before the Philadelphia Laryngological Society, Nov. 12, 1915.

Various manifestations of tuberculosis are mentioned etiologically by several authors. According to Ernst, the most widely accepted cause is a modified, benign tuberculosis of obscure origin, without bacteriologic or serologic proof.

Syphilis accompanied several cases and these responded to anti-syphilitic treatment.

Leukemia and pseudoleukemia are also mentioned, thus offering in explanation diseases of still more obscure etiology.

Gonorrhea is said to have been the factor in one case. This subsided with effective treatment of the alleged cause.

The disease is also attributed to glandular irritation from some toxic agent in the blood or lymph stream, said to bring about lymphatic hyperplasia.

In Ziegler's case retrogression followed the removal of enormously hypertrophied tonsils and adenoids.

"these caused suboxidation with entanglement of subkatabolic products in the lymph glands." He also speaks of the absorption of toxic fluids from the accessory sinuses, chiefly the antrum, transmitted by way of the lymphatic capillaries to these contiguous glands.

Apert suggests hypothyroidism, present in his and one other case.

The disease seems to occur at almost any age from infancy to senility. Both sexes are affected equally. Most of the cases reported in this country occurred in the negro race.

Histology: Lintz roughly divides the cases into two groups: 1. Lymphadenoid hyperplasia. 2. Chronic inflammation.

The tumors have been described as benign lymphomata and as cases of lymphatic hyperplasia. Von Mikulicz gives the histology as follows: "The enlargements were found to be due to massive small cell infiltration of the interstitial connective tissue with only passive participation of actual gland tissue."

Symptoms: Changed appearance due to the enlargements and dependent upon their size. A certain amount of ptosis when the lacrimals are large. There may be some exophthalmos. There is practically no mechanical interference with vision. Xerostomia, according to Lintz, is a prominent symptom and may seriously interfere with mastication and deglutition.

A hitherto unexplained interesting phenomenon is that of the subsidence of the swellings in several intercurrent febrile diseases such as acute pleurisy with effusion, perityphlitis, enteritis, erysipelas, pneumonia, influenza followed by pneumonia, and cholera.

Therapeutics: Von Mikulicz gave injections of pilocarpin without effect. Other therapeutic measures recommended include:

potassium iodide, arsenic exhibited as Fowler's solution, arsenic and ointments of potassium iodide, new tuberculin, Roentgen ray, cure of gonorrhea, surgery for cosmetic effect.

Prognosis: This seems to depend upon the underlying or accompanying condition. The disease in itself is not fatal nor does it tend to shorten life. The duration is anywhere from two months to ten years or more. Cures are sometimes spontaneous. In the cases with leukemia the prognosis is bad, in those with pseudoleukemia, better. In tuberculosis and syphilis the general prognosis applies. There is no recurrence after surgical removal.

In a given case of von Mikulicz's disease it becomes our duty to determine: Which glands are affected; condition of tonsils and nasopharynx; condition of nose and accessory sinuses; involvement of lymph glands, if any; examination of chest and sero-diagnosis for tuberculosis; examination of blood-picture; examination of size of spleen; Wasserman reaction; examination for venereal disease. A differential diagnosis must be made from Hodgkin's disease, lymphadenitis in its various forms, lymphosarcoma.

The patient, B. L., colored, age 20; occupation, housework; the mother of one child; was first seen by me in the Eye Department of the Methodist Episcopal Hospital, Dr. P. H. Moore's service, in May, 1915, to whom I am indebted for the privilege of taking charge of the case.

At that time she complained of the presence of large lumps in the temporal region of the orbits and presented symmetrical tumors, presumably the lacrimal glands, which were palpable as painless, non-tender, indurated, symmetrical masses, non-fluctuating and freely movable, each about the size of an ordinary small chestnut and causing very apparent bilateral ptosis. The Parotids were found to be symmetrically enlarged and palpable as indurated masses extending well forward on the cheeks.

The thyroid gland was symmetrically enlarged to about twice its normal size.

The diagnosis of von Mikulicz's disease was made and the patient was examined further at the Henry Phipp's Institute of the University of Pennsylvania, in June, 1915.

The family history is good. The only facts of any possible significance in the patient's previous history are those of a leucorrheal discharge of three years' duration and a rather persistent cough. A detailed examination has practically excluded pulmonary tuberculosis. The Wasserman reaction is negative. The urine and blood show nothing of significance. No other of the

salivary glands are found enlarged. A few cervical lymphatic and the epitrochlear lymph glands are palpably enlarged.

The spleen is not enlarged. The nose shows swelling of the middle and inferior turbinates of both sides, with partial, variable, alternating stenosis and some muco-purulent discharge. Both tonsils are moderately large and the crypts are filled with caseous and calcareous concretions. The antra are clear. Larynx and ears are apparently normal.

On July 16, 1915, the following notes were made: Lacrimal glands each about the size of a lima bean, feels like a mass of fine pebbles, freely movable, indurated, smaller than it was. Parotids less large. Size of thyroid seems to be stationary. Patient was refracted by some optician. No mydriatic used. The glasses are, right and left + 0.12 D. (almost plane glass). In the opinion of the patient these helped her.

The following notes were made November 3, 1915: The lacrimal glands are not palpable. The parotids have undergone resolution. The nose shows considerably less swelling. The mucosa is quite dry. There is some crust formation and a few ulcerations.

The patient received the following treatment: Fowler's solution, five drops three times daily after meals, a bronchitis mixture and a camphor-menthol-albolene nasal oil. All of these were used very irregularly and for only a very short time. In our opinion, the swellings underwent gradual, spontaneous resolution.

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220 South Sixteenth Street.

IMPROVED KILLIAN SPECULUM FOR OPERATION ON THE ANTRUM OF HIGHMORE. DESCRIPTION OF OPERATION.

DR. JOHN J. SULLIVAN, JR., Scranton, Pa.

Uses. Same as the Killian model for the submucous elevation of the mucous membrane and perichondrium. It elevates both sides above the crest in a deflected septum as in the MacWhinnie method.

Steps in the Operation on the Antrum of Highmore:

1. Cocainize the inferior concha under and above it and also the septum opposite using the Freer method, followed by 1:5000 adrenalin solution.
2. Infract thoroughly the inferior concha upwards. This gives an excellent view of the lateral wall under the inferior concha.



Improved Killian Speculum.

3. Retaining the speculum, if desired, the entire nasoantral wall can be removed. Everything is within sight of the operator.

4. Remove the wall, using a Whiting No. 2 or 3 long mastoid curette.

5. Entrance with the curette should be about the middle and at the point of attachment of the bone with the lateral wall.

6. The floor of the sinus is lowered to that of the nose.

7. All fragments of bone and mucous membrane are removed by suitable forceps. A flap of mucous membrane can easily be loosened if the operator sees fit. Personally, I never take the time to do so. It prolongs the operation and is unnecessary.

8. Wounding the nasal duct anteriorly is avoided by keeping below the attachment of the inferior concha. Avoid the descending palatine canal posteriorly by not cutting into the dense bone at

the posterior limits of the sinus. One inch anterior-posterior is a fairly large opening and I can usually obtain it.

9. Pack with gauze, either iodoform or bismuth. Remove within twenty-four or forty-eight hours and the sinus is then painted with 50 per cent argyrol in glycerin.

10. Occasionally I rasp away the bone in front of and below the attachment of the inferior concha. This allows easier passage of the irrigation tube. I do not favor continual washing of any cavity. Once a week is enough, even in an acute case, providing there are no symptoms of pus retention (pain, chills, etc.)

Nearly all remain open when thoroughly done. This is left to the judgment of the operator. It would border on the extreme radical to make a permanent opening in an acute case. It is always the height of folly to expect an old, chronic case to improve after a small opening. In the latter cases a recurrence may always be expected following a cold in the head. In the past six years I have operated on about one hundred and fifty of the above cases.

402 Wyoming Ave.

Thionin as a Diagnostic Stain in Pyorrhea Alveolaris. MARTIN

DUPRAY, *Jour. A. M. A.*, Feb. 12, 1916.

Thionin, in the author's experience, works exceptionally well as a diagnostic stain for the endameba. The staining solution is prepared according to the following formula: Thionin, 0.5 gm., distilled water, 100.00 c.c., phenol crystals, 2.0 gm. To prepare the slide, a smear is made of the exudate and dried in the air, fixed in the flame and stained for a few seconds, while still warm, with the thionin solution. The cytoplasm of the endameba is stained a purplish violet and the nuclei a deeper reddish violet. Ingested blood corpuscles and other material in the body of the organism are stained black. Pus cells in the smear are stained light blue and their nuclei deep blue. Fusiform bacilli and spirilli are well stained also.

P. F.

New Instruments.

DR. JOHN J. SULLIVAN, JR., Scranton, Pa.

(a) *Tonsil Suture Needle.* One-half side of the Beeman Douglas tonsil needle.



Fig. 1. Tonsil suture needle.

Uses. Retract the anterior pillar, locate the bleeding and grasp with a hemostat. Tie either above or below same. Prevents slipping of the suture.

(b) *Brain Knife.* Marked off in one-fourth inches. As brain tissue is very soft and no resistance is encountered in cutting into it, it is necessary to have a sharp, round-ended knife with the markings to prevent going further than the actual site of the infection. It also serves as a guide to the distance required for drainage. It has always



Fig. 2. Brain knife.

seemed to me that the introduction of a brain forceps or any other spreading instrument is dangerous on account of the softness of the structure.

402 Wyoming Ave.

Fractures of the Mandible: A New Apparatus for Treatment.

L. COULLIAUX, *Annali di Odontologia*, Feb., 1916.

In preference to the bone suture the author describes a device consisting of a thick, gold wire which goes all around the dental arch and embraces gold crowns or rings at the right and left. These crowns, the author believes, are of decided advantage where great strength is needed for holding fragments together. The apparatus is also furnished with screws which assures fastening it to the collars of the teeth.

P. F.

EDITORIAL DEPARTMENT

DEFECTS OF SPEECH.

EDITED BY DR. G. HUDSON-MAKUEN, Philadelphia.

SOME RECENT THEORIES ON THE CAUSATION AND TREATMENT OF STAMMERING.

Of all the affections to which the human organism is subject, there are few more difficult to understand than that of stammering speech, and there are few also that entail more mental suffering to the individual. The very fact that the patient himself cannot understand the affection, coupled with the conflict of opinions which exists in the medical profession with regard to it, tends to increase its subjective importance and seriousness.

The question of the curability of stammering is an interesting one, and in attempting to answer it many things have to be taken into consideration. Much has been written on the physiology of stammering and recently the psychology of the affection has been coming to the fore, with the result that one fact at least has been well established, namely that stammering is a psychical rather than a physical disorder, or rather that stammering is more psychical than physical. It cannot be wholly psychical because it involves important physical activities, the development of which results in the formation of more or less fixed habits, so that one who has acquired stammering speech has acquired also certain physical as well as psychical habits, and the basis of the stammering, therefore, must be regarded as psychophysical in character.

Formerly, stammering was looked upon as a purely physical disorder and attempts were made to cure it by physical or mechanical means, such as operations upon the peripheral organs of speech, with a view to correcting the tendency toward the manifestation of the phenomena, but all this proved to have only temporary if any value, and it was found that to be efficacious the treatment among other things would have to include a readjustment of the patient's

mental and emotional processes which guide and to a great extent control the peripheral organs of speech.

One of the most interesting of the newer theories on the causation of stammering is that of C. S. Bluemel, as embodied in his treatise on the psychology of the affection. Being himself at once a stammerer and a practical psychologist, his views should command respect, and briefly, they may be summarized as follows: Stammering is largely a psychic affection. It is a form of aphasia and due primarily to a transient auditory amnesia. The author claims with some considerable degree of reasonableness that the stammerer stammers because the auditory images of certain elements of speech are not forthcoming at the instant in which they are required for their externalization. This theory is based upon the physiological fact that the elements of speech have distinct cerebral representations and that the peripheral mechanisms of speech depend directly upon these representations for the orderly performance of their functions. In other words, each element of speech is centrally represented by its appropriate auditory image and until this auditory image is forthcoming, the peripheral mechanisms halt or fail to perform their function, and the phenomenon known as stammering ensues.

This theory as to the causation of stammering is an ingenious one, but it is not altogether satisfactory or conclusive because the amnesia is merely itself one of the links in the phenomena of stammering and it is not even the initial link. It is the link just preceding that of halting speech and therefore it may be regarded as an immediate cause, but the primary cause of the affection must be looked for further back.

The fact is that under certain varying and favorable conditions the amnesia does not exist, and when it does exist and when looking for a primary cause we must ask ourselves what is the cause of the amnesia, or what is the link in the phenomena of stammering immediately preceding that of amnesia. This, I would define as being a state of mind characterized by confusion and fear. The confusion is in some instances but little more than that which appears in the minds of most people when about to speak under unusual circumstances, but it is just enough to interfere with the sequence of the normal processes, and the fear appears to be the result of the full consciousness of previous experiences of failure to speak freely under similar subjective and objective conditions.

Hypersensitiveness characterizes all stammerers, and this hypersensitiveness is both a cause and a result of the stammering, and

so we come back to the vicious circle without knowing definitely which of the links in the chain of the circle is the one which should be regarded as the first in point of time, and therefore which of the phenomena of stammering should be regarded as the first or primary cause of the affection.

Mr. Bluemel considers also the possibility of training the auditory imagery in order to increase its distinctness or tangibility, and he calls attention to the fact that just as we may train one's visual imagery and make it sharper and clearer, so we may probably also develop or reintegrate the auditory imagery by suitable exercises and thus cure the amnesia which, by the way, is not, strictly speaking, a verbal amnesia but merely an amnesia for the coloring or inflections of certain syllables and words.

Dr. Walter B. Swift has called attention also to a faulty visual imagery in stammerers, and the fact is, I suppose, that so confused is the stammerer's psychic operations during attempts at speaking, that there necessarily must be confusion in all the psychical processes employed in speech production.

Another theory which is at present claiming the attention of not a few who are interested in stammering speech is that by Dr. William Browning, as published in the *New York State Journal of Medicine*, in 1911.

Dr. Browning is of the opinion that stammering is frequently associated with an enlarged thymus gland, and he has reported twenty-five cases in which he claims that a reduction of this gland by x-ray treatment has seemed to cure the affection.

That stammering may be associated with the enlargement of the various glands of the body is quite possible and even probable, but that it should be cured by the method described seems to me to be little short of miraculous, and I confess that I shall have to see such results as are reported before I can quite bring myself to believe them to be possible. A temporary improvement in the condition of the stammerer usually follows the application of electricity in any of its forms, but this is due, of course, to its psychic effect and to the suggestion which goes with it.

The diagnosis of thymic enlargement by any method whatsoever is not in itself an easy matter, and that a reduction of the enlargement whether by the x-ray or any other method should cure stammering, except possibly in its very initial stages, is quite incomprehensible to me, for whatever else may be said of the affection, we must all admit that in what may be called its chronic stage it has become a complicated psychophysical habit, and whatever may have

been the original cause of its development it is not reasonable to suppose that the removal of this cause can possibly cure the habits of speech which have been acquired as a result of it.

In other words, when one has stammered for even a brief period of time, the habit of stammering becomes so firmly fixed that even if we could by some magic or other means remove once for all the original cause of the affection, the stammering would probably continue at least until the psychophysical habit were corrected by some kind of educational measures.

Dr. Browning's report, however, emphasizes the importance of making a thorough examination of all cases of stammering with a view to detecting physical abnormalities, and when the last word is said with reference to the causation of stammering, it will probably be found that there is no one cause operative in all cases, but that there are many causes for the affection.

We can only say with some degree of reasonableness that there is an irritable condition of the psychomotor areas of speech and that the affection known as stammering may be due to any one of the many things that may disturb these sensitive cerebral areas.

A lenticular lesion, for example, has been suggested by Dr. Jas. Hendrie Lloyd as a possible cause in some cases, and Dr. Charles K. Mills believes that the difficulty may exist in the tonectic series of fibres. He says that the cerebral tonectic apparatus is a mechanism intercalated between the afferent or sensory pathway and the motor projection system and that its function is to adjust or correlate sensory stimuli and motor discharges, giving to the latter rhythm or tone. He furthermore thinks that tone is primarily dependent upon sensation and only secondarily upon idea, and therefore the cause of stammering is more likely to be found in a disturbance of the sensory pathway or of the pyramidal motor apparatus than in a transient auditory amnesia, although this latter condition may exist in some instances.

Another neurologist claims that the defective inhibition found in stammerers may best be explained in terms of the tics, and that stammerers are for the most part neurasthenic and psychasthenic, and it is well known that many stammerers belong to this class, although it is also well known that comparatively few neurasthenics and psychasthenics are stammerers, and many of those having various forms of tics show no disturbance of speech whatsoever.

The problem of finding a causal factor which is common to all stammerers, therefore, still remains unsolved.

PERORAL ENDOSCOPY AND LARYNGEAL SURGERY.

EDITED BY DR. CHEVALIER JACKSON, Pittsburg, Pa.

THYMIC DEATH.

Bronchoscopy has demonstrated that the thymus gland in a state of hypertrophy can compress the trachea and there is also bronchoscopic evidence to show that engorgement of the thymus will increase its bulk so as to increase the tracheal compression. P. Cosima Blinda, of Milan, reports (*Giornale di Elettricità Medica*, Sept.-Oct., 1913) the death of a child during a Roentgen ray examination. At autopsy the hypertrophied thymus was found to contain three large cavities filled with muco-purulent fluid. There is, of course, no evidence of engorgement to be found post-mortem in such cases which seems to account for the fact that congestive compression has never been corroborated autoptically and no mention is made of this in the abstract of the case that appears in the *American Journal of Roentgenology*. Doubtless none was evident. It is to be hoped that bronchoscopists encountering cases of thymic tracheostenosis will be able to make further observation bearing on the element of engorgement in the sudden increase of compression during the struggle incident to anesthetizing a child, and also the engorgement produced by the stimulative effect of ether. In the cases of death with chloroform it would probably be the struggle alone that would cause the engorgement. The necessity for studying the matter in the living offers a special opportunity for bronchoscopy.

INTESTINAL FOREIGN BODIES.

Usually a foreign body that has passed the pylorus will pass with the stools without harm. In a few instances sharp foreign bodies have perforated the intestine causing death by septic peritonitis. For this reason all foreign bodies opaque to the ray should be watched roentgenographically. That a foreign body may lodge in the intestine and remain for a long time is shown by the report (*Canadian Medical Journal*, Sept., 1914, *Amer. Journ. of Roentgenology*) of the case of a needle remaining lodged in the duodenum for a year. After its discovery the needle was seen to remain for quite a length of time without altering position except for slight lateral movements, doubtless peristaltic. The patient had complained of a sharp pain in the region of the umbilicus or a little above it which came on shortly after taking food of any kind. The pain always ceased at the end of digestion. There was occasional nausea but no vomiting and no evidence of blood in the stools. The needle was discovered during a roentgenographic examination with a bismuth meal, and was in a vertical position. It was removed at operation from the duodenum behind the transverse colon.

SOCIETY PROCEEDINGS.
NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Regular Meeting, December 10, 1915.

DR. HUBERT ARROWSMITH, Chairman.

Carcinoma of the Frontal Sinus. DR. MACKENTY.

The patient was a man, fifty years of age, referred to Dr. MacKenty's clinic from the Eye Department at the Manhattan Eye, Ear, and Throat Department. He presented all the appearances of a fronto-ethmoidal supuration, with a sinus through the upper lid. The Killian operation revealed a mass filling the frontal sinus and extending back through the inner plate into the cranial cavity. In the ethmoidal region were found ordinary polypi.

Mucocele of Ethmoid. DR. MACKENTY.

Male, aged thirty; operated upon in the Eye Department for removal of lachrymal sac. This revealed an oblong cavity, extending back into the ethmoidal region. The x-ray showed the absence of bone in the ethmoid region on the right side. External operation revealed a smooth-lined cyst extending back to sphenoid and intimately incorporated with os planum. This was removed in toto with some difficulty on account of thickness of the sac. Result, good.

On the other side there is an elastic projecting mass near the inner canthus, probably a mucocele in the ethmoidal region.

Three cases of Total Laryngectomy. DR. MACKENTY.

(1) Mrs. M.; age, fifty-five, referred to Dr. MacKenty by Dr. H. from another hospital where she was considered inoperable and a tracheal tube inserted. The tube had been worn for two months when she came under observation. The larynx was filled with cancer. Total laryngectomy was performed in December, 1914. At the time of presentation, one year later, there has been no recurrence. The patient has gained thirty pounds in weight and is in good health. She has developed a good whisper.

(2) Mr. L., sixty years of age, had a carcinoma involving the left cord and extending across the middle line, the symptoms extending over four months. The patient was referred to Dr. MacKenty by Dr. T. J. Harris. Total laryngectomy was performed, and the gland bearing tissue on one side was extirpated on July 15. There was tracheal and skin union so good that no tracheal tube is worn.

(3) Mr. E., aged forty-six, was admitted to Dr. MacKenty's service on September 15, his larynx being filled with cancer. Tracheotomy was imperative. Three weeks later, a total laryngectomy was performed. The growth had extended through the cartilage into the pre-tracheal region. All the gland bearing tissue of neck and muscles of the front of neck

were removed by block dissection. There was extensive infection of neck, and ultimate closure was made by plastic operation.

Dr. MacKenty said that the method of treating these cases at operation and subsequently is of the utmost importance. It goes without saying that the operation should be performed as quickly as possible, and with a minimum amount of traumatism. He has performed thirteen laryngectomies to date.

He uses intertracheal anesthesia, which offers many advantages, one of them being that it keeps the trachea free from fluid. Even then, it is advisable to occasionally use suction during the operation, in order to completely free the trachea of blood and mucus.

The manner of dressing the wound after operation prevents the infection of the upper wound. Around the tracheal canula is placed a sheet of rubber tissue, so that all the secretions are brought out on this apron and do not contaminate the wound above. The tracheal tube is wound with gauze and stuffed as tightly as possible into the trachea, in order to prevent the secretions from coming out around the tube, so that all the secretions come through the tube. This tends to prevent infection.

The drainage of these cases is important. As generally employed, it is not sufficient in such cases as these. It is important to drain the wound down to the tracheal stump in order to prevent the infection from going down into the mediastinum.

The after-treatment is exceedingly important, especially the question of feeding. In former times, many of these patients died of starvation, or of acidosis resulting from starvation. The feeding of the patients presented this evening had been carried on by a permanent tube passing through the nose into the esophagus. This tube remained in place during the entire convalescence. In one instance it remained in the esophagus for two months without producing any irritation. The food should be a balanced diet of sugar, oatmeal, butter, and eggs, made into a thick mixture and fed to the patient every six hours, using a piston syringe. From the very first the patient is kept in a good state of nutrition.

Another important point is to keep the trachea free from secretion after the operation. When the larynx is removed, expulsive cough is abolished, the air cannot be compressed behind the glottis and suddenly expelled, as is normal. Therefore the secretions are expelled from the trachea with difficulty. To provide better lung drainage, suction is used through a catheter passed down the trachea to the bifurcation. This is done as often as seems necessary.

When plastic closure of the wound is required, it should not be performed until all evidences of infection are gone and the wound has contracted down and looks healthy.

DISCUSSION.

DR. ARROWSMITH asked if the carcinoma of the frontal sinus showed a metamorphosis.

DR. MACKENTY replied that this was his opinion, as normal polypi were found in the nasal cavity, shading off into the neoplasm.

DR. ARROWSMITH remarked that he supposed there was no reason they should not occur simultaneously.

Dr. MacKenty was certainly to be congratulated with the results obtained in the case of carcinoma of the larynx. The technique and after-treatment of the case had impressed him very much.

Specimen of Tonsil from the Throat of a Child. DR. J. D. KERNAN.

Dr. Kernan presented a tonsil removed by Dr. Hume from the throat of a child five years of age, who gave no special history of any trouble in the throat. The tonsil was impaled on a hairpin.

DISCUSSION.

DR. HAYS said that undoubtedly the object looked like a hairpin, but he would like to know if any previous attempt had been made to remove the tonsil, because it looked very much like a piece of wire used in a tonsil snare.

DR. KERNAN said that he had had some hopes of obtaining such a history, but the mother declared that there had never been any operative interference, and when the object was examined closely it was found to be a soft, malleable wire such as is used in making hairpins. He felt quite sure that that was what it was.

DR. ARROWSMITH stated that he had had two similar cases, one of them being a man whom he had been called to see during an attack of peritonsillitis; and when the acute attack had subsided he suggested that it might be well to remove the tonsil, but the man declined, saying that he had had one operation on his tonsil, and the operator had used an instrument which broke and came out on the outside of his neck; and upon being asked how the doctor removed it, he replied: "He just pulled it out." The other patient was a girl whose business it was to wind fine copper wire around armatures, and she ordinarily held the wire between her teeth, to start it. When she came to the clinic she said she was afraid she had gotten some of the wire in her tonsil. None could be seen, however, and palpation did not seem to increase her discomfort. She returned two or three times, however, and finally the tonsil was removed and in it were found two or three inches of the fine copper wire.

Thyrotomy. DR. J. D. KERNAN.

Dr. Kernan said that he had presented this patient before the Section last spring. Two years before admission to the hospital he suffered from a painful swelling in the throat, which discharged pus. After that he was hoarse for two years, up to the time of his admission to the hospital. He suffered from increasing dyspnoea, and soon after admission he required a tracheotomy. Since his admission to the hospital various measures had been employed in the effort to reduce the swelling in the larynx,—suspension laryngoscopy with cauterization, large doses of potassium iodid and mercury, several doses of salvarsan, etc. Both the Wassermann and tuberculin tests were negative. A month ago a thyrotomy was performed, and a small area of granulation was found in the larynx, leading down to dead bone on the cricoid. All the scar tissue and dead bone were removed, and it was hoped that it would be possible to keep the passage through the larynx open. The man can breathe through the opening with the tube plugged, and has an almost audible voice.

Laryngectomy. DR. J. D. KERNAN.

The patient was a man 51 years of age, who was referred to Dr. Chappell's clinic seven months ago. He gave a history of having suffered from hoarseness for five years, which gradually increased in severity. Three weeks before he noticed a difficulty in breathing, which had become so severe as to bring him to the clinic. His appearance was that of a man suffering from severe dyspnoea. The larynx appeared to be almost completely filled by a nodular tumor which took origin chiefly from the right vocal cord, right ventricle, and anterior commissure.

An immediate tracheotomy was done under local anesthesia. Wassermann was negative. The specimen removed by direct laryngoscopy proved it to be carcinoma.

A thyrotomy was performed. The tissue separated easily and was removed down to the cartilage, wide of the edges of the growth. The patient made a good recovery, with full use of the larynx from the first, and the tracheotomy wound promptly healed.

Two months later, there was a small recurrence springing from the right side. A second operation was performed on September 6th, removing the growth and underlying cartilage,—that is the right wing of the thyroid and the anterior part of the left wing. The patient made as prompt a recovery of function of the larynx as before; but soon had another recurrence.

On November 1st, a total laryngectomy was performed. The patient was fed by a tube passed through the nose for three weeks.

The points to be noted in this case were: (1) The long history of hoarseness with rapid development of obstruction, pointing to the existence at first of a benign tumor which underwent malignant degeneration. (2) The use of the laryngoscope for diagnosis. Total laryngectomy undesirable without preliminary taking of section. (3) Thyrotomy is a tempting operation, because of quick functional results, but unjustifiable if the growth is large. (4) The difficulty of handling of tracheal stumps after a preliminary tracheotomy.

DISCUSSION.

Referring to Dr. Kernan's case, DR. MACKENTY said he favored the one-stage operation. In thirteen laryngectomies he had had no deaths,—and in all of these only one operation was done. The drainage should be placed so as to safeguard the space behind the trachea. When suppuration occurs, as it frequently does, liberal drainage must be secured with frequent changes of drains and dressings. The tracheal stump deserves special mention. A cartilaginous ring is removed, leaving a cuff of mucous membrane. Three anchor stitches are placed, which draw the stump up to the skin level. Then the skin and mucous membranes of the trachea are carefully united. To secure primary union here is of a great advantage in the subsequent treatment. The tracheal tube must be made to fit tight by winding vaseline-bismuth gauze around it. This prevents the tracheal secretions from reaching the skin-tracheal union.

Dr. Kernan was to be congratulated upon the results secured in the case. It got well very quickly and had almost primary union. These patients are supposed to have no voice, but it is remarkable to see how

some of them develop quite an audible voice to those who are accustomed to listening to them. One old lady upon whom he (Dr. MacKenty) had operated a year ago, can be heard quite well by those sitting close to her. He has had no experience with the use of artificial means for producing a voice.

DR. LEDERMAN said that as far back as twenty-five years ago, he had seen a case in which laryngectomy was performed for epithelioma. The patient had simply a musical reed fitted in the tracheotomy tube, and he had quite a distinct but monotonous voice. When he had any obstruction in breathing, he removed the reed. The mechanical larynx was suggested by the apparatus of Gussenbauer.

Right Adductor Paralysis. DR. HURD.

The patient was a man from the Bellevue Medical Clinic, who was forty-seven years of age, who suddenly developed hoarseness about two months ago. Examination of the heart and lungs was negative except for a high-pitched breathing at the apex of the right lung. Wassermann, negative. The man has a right adductor paralysis; and the x-ray shows an aneurysm. That, however, has nothing to do with it. There is a contrast between the two sides at the apices of the lungs. Dr. Hurd said that he suspected a little tubercular pleurisy in the apex of the lung, which involved the laryngeal nerve.

A Case of Vincent's Angina. DR. HURD.

This was a young man with an extensive involvement at the junction of the upper and lower jaw and the neck on the left side. There was also some involvement of the tonsils, and some of the cheek, and around the alveolar borders of the gum. Wassermann was negative. Vincent's spiriform and fusiform bacilli were found.

The patient was presented as showing a typical case of Vincent's Angina. He had had no treatment excepting tincture of iodine a couple of times, which has had no appreciable effect. Dr. Hurd said that he would use salvarsan, but at present this could not be obtained by the clinic.

DISCUSSION.

DR. LEDERMAN asked if Dr. Hurd had ever tried cresatine in these cases. It is a substitute for carbolic acid, but has not its escharotic action. He had heard recently of its having been used satisfactorily in four or five cases of Vincent's Angina and he himself had used it in the ear, throat and nose, applying it locally with good results. It has been tested bacteriologically and has been found very active as a germicide. Dr. Barnert personally had reported its use in some eighteen cases of gonorrheal ophthalmia with excellent results. The speaker published his observations with cresatine in *THE LARYNGOSCOPE*, March, 1911.

DR. ARROWSMITH said that salvarsan is an absolute specific for Vincent's angina.

Radiographs of Frontal Sinus Conditions. DR. MEIERHOF.

The plates were made from a patient twenty-three years of age who, for a number of years, suffered from a purulent discharge from the nose, and also from a purulent laryngitis. She was transilluminated, with negative results. Then the middle turbinate was removed, showing absence of disease, but still the nose continued to discharge.

Then the x-ray plates were made. These showed some high ethmoid cells and the entire absence of the external and inner walls. The discharge continued, and it was finally concluded that it was an intra-nasal suppuration. On this basis it was treated with a 3 per cent. solution of nitrate of silver, with excellent results, and the discharge practically ceased, although it had been going on since infancy.

The tendency nowadays is to look for the source in the accessory sinuses, but in this instance it was entirely in the nose.

DISCUSSION.

DR. ARROWSMITH said that many years ago, shortly after Dr. Wright had organized his clinic a patient came in for whom Dr. Wright advised a radical frontal sinus operation. That was, of course, in pre-x-ray days. The patient agreed to the operation, and the Doctor made a skin incision and then worked in until he got to the cranial cavity. The patient died in two or three days. An autopsy was made and some sixteen or eighteen well developed old abscesses were found in the brain tissue, some of them as large as a good-sized hickory nut. The complete absence of both frontal abscesses was also demonstrated. Dr. Arrowsmith said that he had seen the same thing in one other case in which an external operation was attempted, and in which he went in for over half an inch; and then remembering this former experience he desisted. Later on it was possible to x-ray the patient, and it was found that she had no frontal sinus.

DR. HURD told of two cases in which the x-ray showed complete absence of the frontal sinus. One had a double radical operation, and had no frontal sinus; and in the other, that was an absence of the sinus on one side. Some years ago, also, he was studying the question of frontal sinuses, and came upon two heads with the frontal sinuses missing.

Simple Method of Removing the Tonsils Under Local Anesthesia.

DR. HAROLD HAYS.

Dr. Hays said that some time ago it occurred to him that the method of removing the tonsils under local anesthesia could be simplified. He then described the following method:

The throat is first sprayed with ten per cent cocaine solution and the anterior and posterior pillars of the tonsil injected with a one-quarter of one per cent solution of cocaine, to which was added an equal amount of adrenalin. As much as thirty mm. can be used on either side. (Various colored pictures were presented showing the steps of the operation.)

After cocaineization the anterior pillar is severed by means of the author's tonsil knife. Dr. Hays then presented a modified aneurism needle on which he threads a piece of string. This string is inserted through the deep tonsillar tissue from below upward, thus threading it through the tonsil so that it may be used instead of a forceps, which always seemed to him a barbarous instrument. The tonsil is then more thoroughly dissected by means of the Hurd tonsil separator, and the rest of the dissecting is completed by retracting with the string and using the index finger as a separator. The snare then severs the pedicle of tissue that remains.

Dr. Hays said that he had recently found a new use for this suture carrier, and that was in using it to bring together the anterior and pos-

terior pillars in cases of severe tonsillar hemorrhage. In a recent case of tonsillectomy in an adult, where the tonsils were very much diseased and adherent, there was a severe hemorrhage at the time of the operation. The most important bleeding point was ligated, but still a great deal of oozing continued. The tonsil suture carrier was threaded with a No. 1 plain catgut. Each pillar was caught up with a forceps and the two were brought together very neatly with the catgut. At the end of two days the suture had absorbed. There was very little reaction.

Multiple Papilloma of the Mouth. DR. ARROWSMITH.

Dr. Arrowsmith presented this as a rather unusual case of multiple papilloma of the mouth. Single papilloma of the mouth and oro-pharynx are very common, but in this six-year-old boy he had counted between fifty and sixty. They were on the mouth and mucous membrane of the cheeks, lips, and alveolar processes. The child's mother had noticed them for about a year previous to bringing him to Dr. Arrowsmith on May, 1914. Dr. Hulst had pronounced the excrescences histologically true papilloma. The boy's health was good, and the only apparent etiological factor being dental caries. In about eight sittings all the visible growths were fulgurated, the little patient being very tolerant. There was no reaction or pain after the fulguration, and absolutely no recurrence.

The pictures, kindly taken by Dr. N. C. Beers, showed the original condition very plainly.

Malignant Hypernephroma of the Ethmoidal Region. DR. ARROWSMITH.
(Published in the present issue of THE LARYNGOSCOPE.)

Carcinoma of the Nasopharynx. WESLEY E. GATEWOOD, *Jour. A. M. A.*, Feb. 12, 1916.

The tumor in the later stages always appears irregular, fungus-like, gray, multilobulated, covered by a bloody, purulent exudate, and may be very hard or soft, depending upon the histologic variety. The younger the individual the more rapidly fatal is the carcinoma as a general rule. Extension may take place (1) along the inferior or pharyngeal route, the soft palate becoming rapidly invaded; (2) laterally, with early invasion of the Eustachian tube (this route is not frequent); (3) anterior or nasal route, with invasion of the sphenoid, frontal and ethmoid sinuses and ultimate involvement of the anterior cerebral fossa; (4) posterior or cranial route, which is not common. Carcinoma of the nasopharynx very rarely produces visceral metastases. From the few recorded cases it would seem that the disease is rare. Gatewood reports two cases, one in a boy of nine years, the other in a young physician. P. F.

